ENVIRONMENTAL ASSESSMENT
LIME SLUDGE MONOFILL
AT FORT RILEY, KANSAS

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

Fort Riley's Drinking Water Treatment Plant (DWTP) "softens" potable water by removing the dissolved minerals present in the raw "hard" water that enters the plant. Softening is accomplished by the addition of lime during the water treatment process, which causes hardness-causing dissolved minerals to precipitate, or separate from the drinking water solution. Those separated minerals and a component of water comprise waste slurry that is applied to drying beds at the DWTP for dewatering. The dewatering process leaves behind a solid waste known as "lime sludge".

The installation currently disposes of its lime sludge on post at the Fort Riley Construction & Demolition Landfill (CDL) within a monofill cell (a cell where a specific waste provides the fill and daily cover, forms the liner, and sometimes the final cap). Fort Riley operates the CDL under a permit granted by the Kansas Department of Health and Environment (KDHE). Fort Riley expects to fill the lime sludge monofill cell to its capacity within approximately two to three years. Thus, installation planners have identified the need for a new monofill for lime sludge disposal. This Environmental Assessment (EA) analyzes the proposed new Fort Riley monofill for lime sludge disposal.

1.1. Scope of the Analysis

Analysis of the Proposed Action to construct and use the lime sludge monofill at Fort Riley constitutes the scope of the EA. This EA will identify, discuss, and analyze:

- Construction of the proposed monofill,
- Anticipated use of the proposed monofill, including requirements for environmental monitoring and reporting,
- Activities to close the proposed monofill after the anticipated volume of lime sludge would fill the cell to its capacity,
- Positive and negative environmental effects of the Proposed Action and the No Action alternatives, and
- The anticipated cumulative environmental impact of each alternative course of action.

This EA discusses the implementation of the Proposed Action and a No Action alternative, thoroughly examines the local and regional environment as affected by each alternative, and then summarizes the results to facilitate informed decision-making. Fort Riley analyzes the potential effect of the Proposed Action to natural and cultural resources, human health and safety, land use, the sociological environment, and the military mission. The EA will analyze the potential implementation effects of both proposed alternatives, and will then analyze both alternatives in relation to other reasonably foreseeable actions to examine potential cumulative effects.

1.2. Issues and Public Concerns

A team of Fort Riley civilians and military personnel developedthe proposed action and sited the facility during planning sessions to design the monofill. Those sessions helped identify the proposed action's environmental issues and potential public concerns, which Fort Riley analyzed in detail during the writing of this EA. Sources included Army trainers and Command, Department of Defense (DoD) civilian employees, published literature, stakeholders, and customers.

The identified issues include:

- Potential impacts (or perceived potential impacts) to the health and wellness of Fort Riley residents, or citizens of nearby communities, or both, from potentially hazardous leachate (or other hazards) associated with monofills,
- Potential direct impacts to the monofill site and local environment from the proposed facility's construction and use,
- Potential impacts to migratory birds and other wildlife, including threatened and endangered species, and
- The potential for the Proposed Action to impact mission activities at Fort Riley.

1.3. Regulatory Compliance

As required by law, the purpose of this EA is to evaluate positive and negative environmental impact of the proposed construction and use of the monofill at Fort Riley. This EA complies with the National Environmental Policy Act (NEPA), Council of Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations (CFR) 1500 et. seq.), and Army Regulation (AR) 200-2, *Environmental Analysis of Army Actions*.

The NEPA of 1969, as amended (Public Law 91-190, 42 United States Code 4321 et seq.) and implemented by the CEQ regulations, was created to prevent, eliminate, or minimize negative environmental effects from federal projects and activities during the planning stages through mitigation, avoidance, or both. Any action that could have an impact on human health, any natural system (air, water, soil, plant, animal, or other resources) or any social or economic system, upon which there is an expenditure of federal funds, must receive some level of environmental analysis to determine the effects of that action.

2.0 ALTERNATIVES CONSIDERED

2.1. Introduction

This section includes the following elements:

- A description of the process used to formulate the alternatives that were analyzed in detail,
- A discussion of other alternatives that were initially considered for detailed analysis but later eliminated, and the reasons they were eliminated,
- A description of the Proposed Action and the No Action alternative,
- The identification of the preferred alternative.

An interdisciplinary Fort Riley team formulated feasible alternatives based on: a requisite for the installation to continue its processes that produce high-quality drinking water at a reasonable cost; guidance provided by military personnel and DoD civilians; and input from staff of the Environmental Division, Directorate of Public Works (DPW), Fort Riley. Other critical factors taken into account during the development of alternatives included public concerns and issues.

2.2. Alternatives Eliminated from Detailed Study

Fort Riley's planners initially considered either disposing of the lime sludge off the installation or land applying it on the installation after the monofill cell of the Fort Riley CDL, where the lime sludge is currently disposed, is filled to capacity. Both alternatives were ultimately rejected. Installation planners determined that hauling the lime sludge off-post for disposal was cost-prohibitive, and that land application was infeasible due to the unpredictability of access to lands used for military training and the high cost of implementation of that option. Thus, Fort Riley pursued the on-post monofill option instead.

Fort Riley considered two alternate sites for the proposed monofill. Both alternate sites lie on upland areas within three-quarters of a mile of the existing DWTP (Figure 2.1).

The first alternate site lies just north of the DWTP, but the installation ultimately elected to reserve that area for future family housing as part of the Residential Communities Initiative (RCI), which privatizes Army family housing. The second alternate site lies east of the DWTP, and east of the site eventually selected for the preferred alternative. Fort Riley once quarried rock from the second alternate site, and thus, the installation would not have disturbed a natural landscape if the monofill were constructed there. However, the site proved too small and would have required extensive site preparation.

2.3. Alternative 1– Construction and Use of the Lime Sludge Monofill

There are three aspects of Fort Riley's Proposed Action. The first aspect is the construction of the proposed monofill; the second aspect is the projected use of that monofill, and the third aspect is the closure and post-closure monitoring phases of the monofill. The installation would control activities associated with each aspect of the monofill's operation by adhering to its plan entitled *Operating Plan, Industrial Monofill for Lime Sludge Disposal, Fort Riley, Kansas,* (in draft form at the time of this writing), hereafter referred to as the Operating Plan (OP). The EA describes each of the three aspects of monofill operations below.

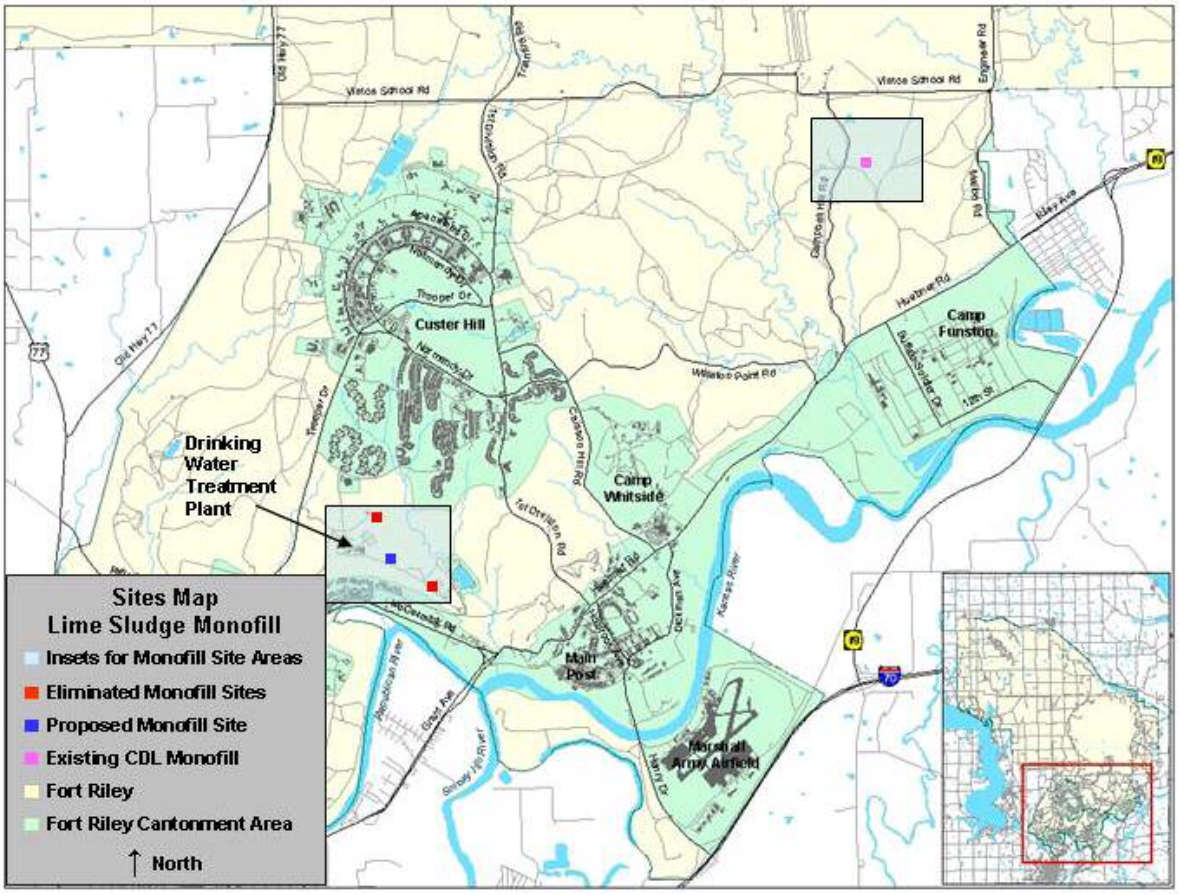

Figure 2.1 Monofill Sites Map

2.3.1. Monofill Construction

Prior to the initiation of construction activities, Fort Riley would acquire a solid waste monofill permit from the KDHE to ensure that the proposed monofill meets the requirements of state and federal law; and protects local soil and groundwater resources. Fort Riley would construct the monofill on an upland site one-fifth of a mile east of the existing DWTP (Figure 2.1). The monofill would consist of a bermed cell and perimeter fencing, with a graveled entryway that connects to an existing road (Figure 2.2). Construction personnel would excavate soil to a five-foot depth to form the monofill's interior basin, and then use that excavated soil to build the perimeter berm (Figure 2.3). Fort Riley's design would create an interior cell for lime sludge 400 feet in length, 250 feet in width, and with the capacity to hold approximately 81,000 cubic yards of lime sludge. The overall dimensions of the earthen portion of the monofill, including the perimeter berm measured to its centers, would extend to approximately 540 feet by 390 feet. Side slopes of four-to-one on the interior and exterior of the berm would allow heavy equipment to operate on the berm to dump lime sludge into the monofill, and would permit earthmoving equipment to enter the cell to move the lime sludge to the desired location in the facility.

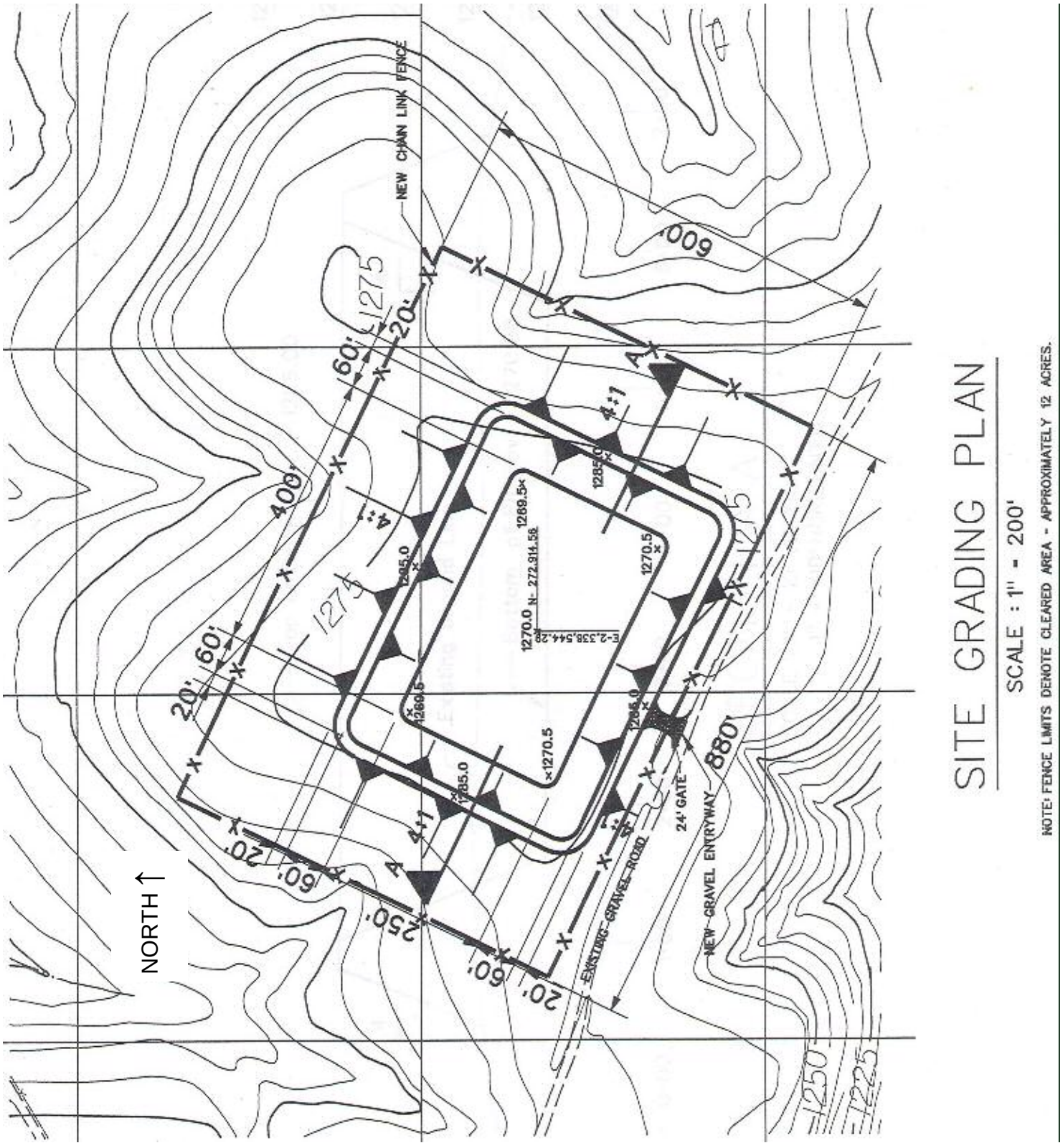

Figure 2.2 Monofill Site Plan

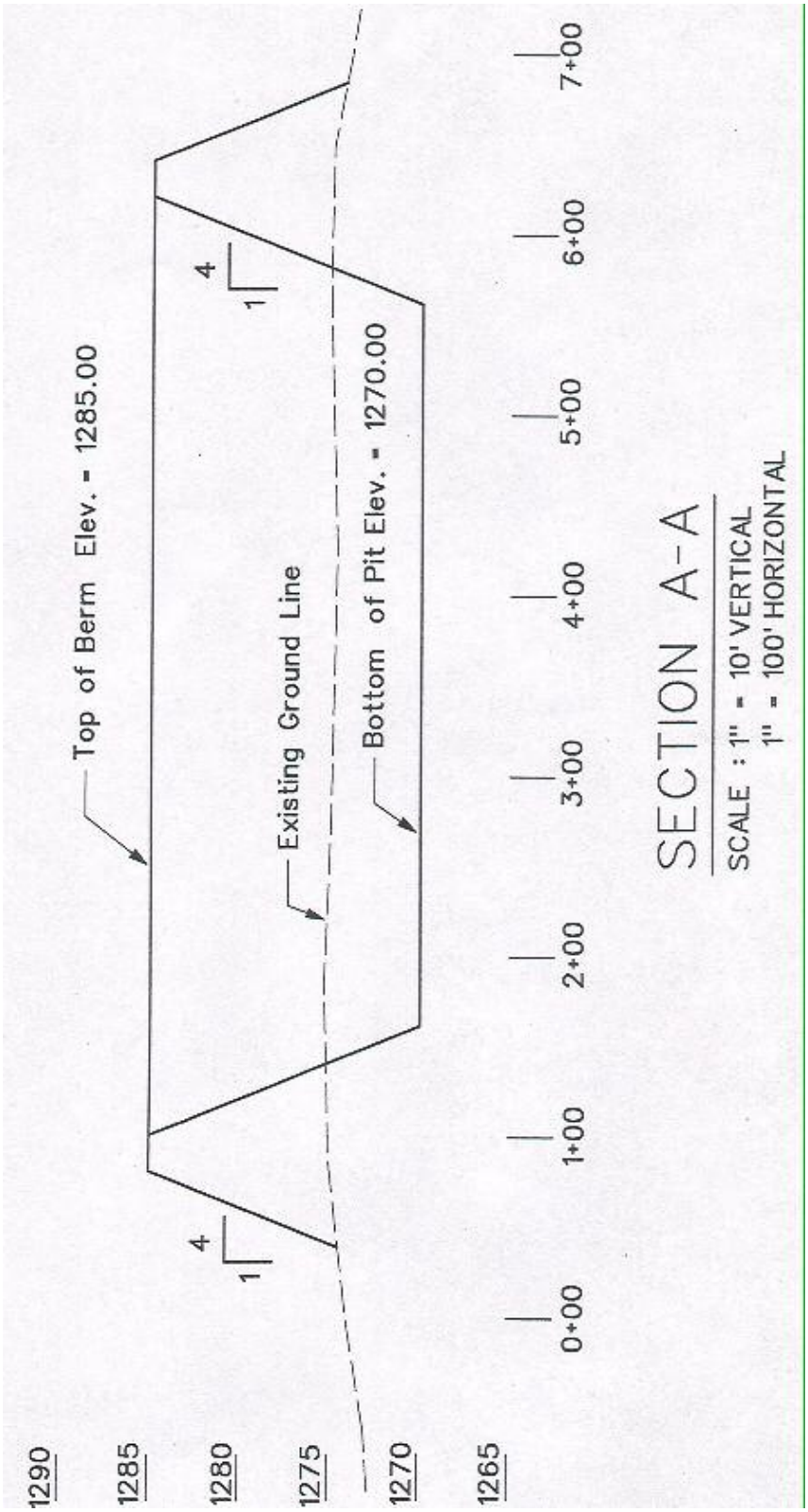

Figure 2.3 Monofill Elevations

2.3.2. Monofill Use

Personnel of the DPW would operate the monofill in accordance with federal and state regulations, and the OP. The DPW would accept at the monofill only lime sludge from the DWTP, would control access to the monofill with fencing and a locked gate, and would maintain appropriate monofill signage. Additionally, DPW staff would manage construction quality assurance, facilities and equipment maintenance, waste placement, dust control, stormwater management, cover requirements, safety, recordkeeping, KDHE reporting, and monofill closure and monitoring procedures in accordance with federal and state regulations, and the OP.

Installation personnel would use dump trucks to haul lime sludge from the nearby DWTP drying beds to the proposed monofill, and would use heavy equipment to move and place the material after its deposition inside the cell. In the past those activities have been intermittent (usually three-day events several times per year), dependent upon whether the removal of lime sludge from the DWTP drying beds was needed to free-up capacity there; the degree to which higher priority projects affected the availability of installation equipment and labor; and whether inclement conditions out-of-doors prohibited the work. Fort Riley anticipates that future hauling operations to the proposed monofill would remain intermittent, and anticipates short durations for each intermittent hauling event.

Fort Riley would retain all documents concerning the monofill's permitting and construction for a minimum of five years after the 30-year post-closure period; and for each monofill operation during its active period, would retain all documents for a minimum of five years after that operation. The installation would report to the KDHE the amount of lime sludge disposed at the facility, information required for permit renewals, and additional information, as required by the conditions of the KDHE solid waste monofill permit.

2.3.3. Monofill Closure and Monitoring

As Figure 2.4 depicts, Fort Riley projects a theoretical lifespan of 12.9 years for the proposed monofill based on its volume capacity. The installation would provide the KDHE written notification of intent to close the monofill at least 60 days prior to the initiation of closure activities. Fort Riley would close the monofill and install its topsoil cap (Figure 2.4) within six months of receiving the last batch of lime sludge. The cap would be seeded with native grasses and maintained in accordance with federal and state regulations, and the OP. The installation would notify the KDHE after closing the monofill (if implementation of the proposed action occurs) to facilitate a closure inspection and the scheduling of the 30-year post-closure care of the monofill; and would perform annual inspections and maintenance as required to ensure the integrity of the cap and its vegetative cover.

Construction and use of the proposed monofill would benefit military training and readiness by ensuring the ability of Fort Riley to produce a safe and ready supply of potable water for its soldiers and citizens. The proposed action is anticipated to have overall minimal adverse effect to natural resources, and positive effect to several aspects of the sociological environment, including the military mission. Therefore, this is the Preferred Alternative.

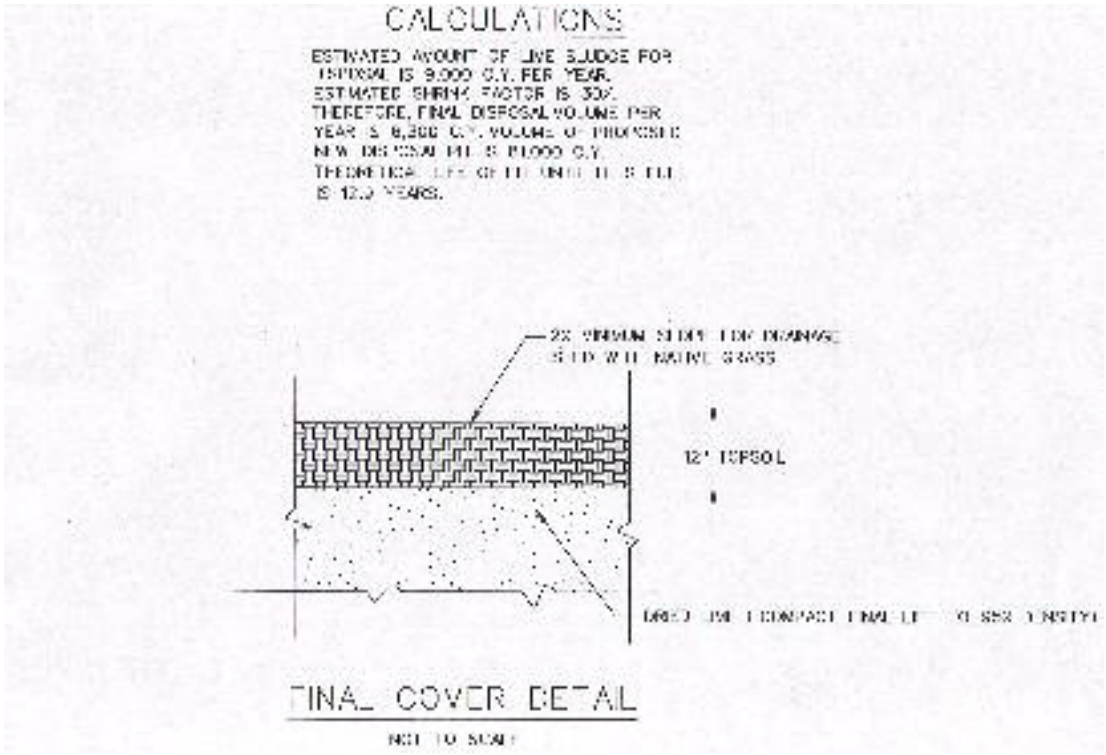

Figure 2.4 Monofill Lifespan Calculations and Cap Details

2.4. Alternative 2– No Action

Under the No Action alternative, there would be no activity to construct and use the proposed monofill. Fort Riley cantonment facilities would remain at current, or baseline, levels. The No Action alternative serves to define the existing condition of Fort Riley, and contributes to the description of the environmental baseline as is required by the CEQ.

3.0 DESCRIPTION OF FORT RILEY

This section describes those attributes of Fort Riley that would not be affected by the Proposed Action. These are physical attributes such as location, setting, geology, and climate.

3.1. Location

Fort Riley is an Army installation located in Geary, Riley, and Clay Counties of northeastern Kansas (Figure 3.1). The installation is approximately 135 miles west of Kansas City and 130 miles north-northeast of Wichita.

3.2. Setting

The general character of the area surrounding Fort Riley is rural with small farm communities. Lands north of Fort Riley support row crop and cereal grain production. Lands to the south are predominantly rangeland. The Republican, Smoky Hill, and Kansas Rivers form part of the installation's southern boundary. Milford Lake, a 15,000-acre impoundment of the Republican River, forms part of the installation's west boundary. The installation is adjacent to one sizeable community to the southwest (Junction City) and lies near another to the east (Manhattan).

The ecoregional province in which Fort Riley lies is Prairie Parkland (temperate) (Bailey, 1995). Fort Riley's parkland system is maintained primarily by anthropogenic (human-produced) influences and, secondarily, by natural factors. The grasslands are interspersed by linear communities of woodlands, highly variable in width, that are associated with streams, other woodland plantings, relatively small, man-made water impoundments, and structures. The closer the tributary streams are to the Republican or Kansas Rivers, the greater their influence on flora and fauna. The flora and fauna in some locations are further influenced by their proximity to Milford Lake.

3.3. Topography and Geology

Fort Riley lies within the Osage Plains section of the Central Lowlands physiographic province. It is bordered by the Great Plains on the west and the Ozark Plateau on the east. Elevations on Fort Riley vary from 1,025 to 1,365 feet above mean sea level. Terrain varies from alluvial bottomlands along the Republican and Kansas Rivers on the southern portion of the installation, through the hilly to steep lands in the central and east portions, to the high uplands in the north and west portions.

Fort Riley consists of three types of topographical-physiographic area: 1) high upland prairies; 2) alluvial bottomland flood plains; and 3) broken and hilly transition zones. The high upland prairies consist of alternating layers of very gently dipping (less than one degree) Permian limestone and shale. The uplands often contain various shale units that cover the escarpment-forming limestones. The cutting action of streams on the thick shale units has sculpted much of the area into a rolling plateau. Two types of alluvial bottomlands exist at Fort Riley: wide meandering floodplains of major rivers, with associated terraces; and areas created by smaller creeks and streams that cut the uplands. The transitional areas, extending from the uplands down to the valley floors are broken, sloping to steep country composed of alternating limestones and shales.

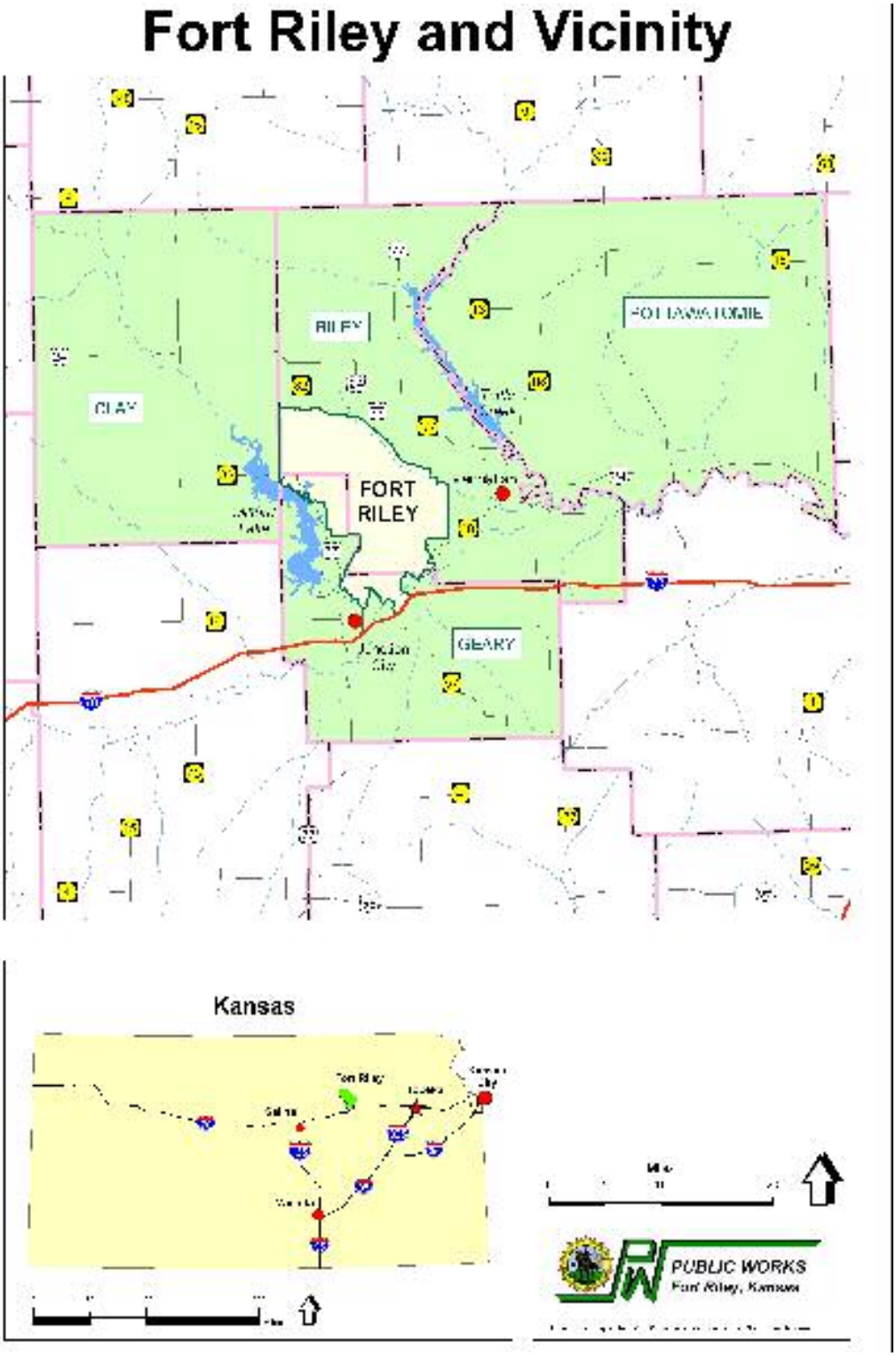

Figure 3.1 Location of Fort Riley

Fort Riley is located within an area that has the possibility of earthquakes producing moderate structural damage. A small fault located northeast of Fort Riley near Tuttle Creek Lake appears to be inactive. No other identified geologic hazards exist in the Fort Riley area.

3.4. Climate

The description of Fort Riley's climate is taken from the U.S. Department of Agriculture (USDA) and is based on 100-year data. Although these data were published in 1975, they continue to be reflective of the Fort Riley region. Fort Riley has a temperate continental climate characterized by hot summers, cold, dry winters, moderate winds, low humidity, and a pronounced peak in rainfall late in the spring and in the first half of summer. Prevailing winds are from the south to southwest during most of the year. During February and March, the prevailing winds are from the north.

Temperatures in the Fort Riley area vary widely and often fluctuate abruptly throughout the year. July and August are the hottest months, averaging 80° F. January is the coldest month averaging 26° F. The average date of the last killing frost in spring is 22 April, and the average date of the first killing frost of the fall is 17 October. The area has an average of 180 frost-free days per year.

Average yearly precipitation is 31.64 inches (in.) and most of the precipitation (75%) falls within the six-month period from April through September. The three highest rainfall months (May, June, and July) each average more than 4 in. per month. Much of this precipitation occurs during severe thunderstorms, when 2 in. or more of rain may fall in one storm. December, January, and February are the driest. An average of about 22 in. of snowfall occurs annually.

Insufficient precipitation is one of the major limiting factors to plant growth at Fort Riley. Spring rains normally are adequate to recharge soil moisture before the summer months when evapotranspiration rates typically exceed precipitation rates. This is especially the case during the latter half of the summer. Soil moisture in the upper soil levels is depleted, which stresses shallow rooted plants during years of below average rainfall.

4.0 AFFECTED ENVIRONMENT

Pursuant to AR 200-2, this section focuses on those elements of the environment that could potentially sustain an impact from the proposed alternatives. For this analysis, these environmental elements include solid waste management; lime sludge regulation and safety; land use; air quality; soil and water resources; flora and fauna, including threatened and endangered (T&E) species; cultural resources; the sociological environment; and the military mission.

For many elements of the environment, Fort Riley anticipates no effect to the baseline condition from the proposed alternatives. Anticipated unaffected elements of the Fort Riley environment include environmental noise, airspace, infrastructure, protection of children, and environmental justice. Thus, this EA does not describe or analyze those elements. Fort Riley provides broad descriptions of its environment in many other published documents such as management plans and other EAs. Those documents include Fort Riley's 2001 *Integrated Natural Resources Management Plan* (INRMP) and the *2004 Endangered Species Management Plan* (ESMP). The *2004 Environmental Assessment, Modular Reorganization of Forces for Fort Riley Army Installation, Kansas,* contains additional background information about the installation's existing environment.

4.1. Fort Riley Environment for Solid Waste Management

This section describes key aspects of Fort Riley's management and recycling of solid waste, the management of the installation's single active landfill (the CDL), and the installation's activities to monitor and manage closed on-post landfills.

4.1.1. Overview

The Environmental Division, DPW manages an Integrated Solid Waste Management Program to comply with federal, state, Army, and local solid waste regulations that require safe and sanitary solid waste disposal or diversion (or both). The Integrated Solid Waste Management Plan (ISWMP) describes policy, assigns responsibilities, and established procedures for all aspects of solid waste management.

Solid waste is defined as garbage, refuse, waste tires, and other discarded materials, including, but not limited to, solid, semi-solid, sludge, liquid, and contained-gaseous waste materials resulting from industrial, commercial, agricultural, and domestic activities. Solid waste does not include hazardous waste, recyclables, or the waste of domestic animals. Household trash and trash from Fort Riley organizations, which is unsuitable for recycling, is collected by a refuse contractor and hauled off-post for eventual disposal at a sanitary landfill. Recycling is mandatory on Fort Riley for all military personnel and civilians, including residents and contractors.

Fort Riley operates a curbside recycling program for residents, and provides a recycling program for organizations that collects recyclables at organizational facilities. Additionally, special recycling procedures allow residents or organizations, or both, to recycle a host of materials:

- Motor oil and other automobile fluids,
- Automobile batteries,
- Aerosol cans,
- Propane cylinders,

- Various types of filters,
- Blast media,
- Circuit boards,
- Compressed gas cylinders,
- Corrugated cardboard,
- Glass bottles and jars,
- Lamps,
- Magazines and catalogues,
- Mercury thermostats and switches,
- Metal shavings,
- Newspaper; paper,
- Off-specification fuel,
- Metal containers for petroleum, oil, and lubricant (POL),
- Plastic bottles and jars,
- POL-contaminated soil,
- Scrap metal,
- Solvent,
- Steel food and beverage cans,
- Toner cartridges,
- Used oil,
- Wood pallets,
- Furniture,
- Household hazardous waste (e.g., ammonia-based cleaning products, oven cleaning products, disinfectants, paint, pesticides); and
- Yard waste.

Other aspects of Fort Riley's Integrated Solid Waste Management Program include regular inspections of motor pool solid waste containers to ensure the appropriateness of waste disposed in those containers, a reporting procedure for illegal dumpsites, and post-wide spring and fall cleanups that encourage military and civilian personnel to dispose of their solid waste and recyclables at approved locations.

Fort Riley's construction and demolition debris comprises a waste stream separate from the household and organizational stream described under this section of the EA. Disposal of the installation's construction and demolition debris at the existing CDL, which currently includes a separate active cell for lime sludge disposal, is described in the next section.

4.1.2. Construction/Demolition Landfill

As described in Section 1.0, a CDL is operated on the installation under a permit from the KDHE. The disposal of Fort Riley construction and demolition debris at the CDL is managed by a contractor. Construction-related solid waste accepted at the CDL includes the following solid waste items resulting from construction, remodeling, repair, and demolition of structures, roads, sidewalks, and utilities:

- Bricks, concrete, other masonry materials, roofing materials, soil, rock, wood, wood products, wall coverings, plaster, drywall, plumbing fixtures, electrical wiring, and electrical components not containing hazardous materials,
- Lumber and sawdust,
- Motor vehicle window glass,
- Vegetation (excluding normal yard waste) from land clearing and grubbing, utility maintenance, and seasonal or storm-related cleanup,
- Treated lumber and asbestos containing material (those materials are separated from other materials and deposited in special cells at the CDL),
- Mixtures of clean rubble and other waste that result from construction or demolition processes, and
- Concertina wire.

The CDL will not accept garbage, recyclables, appliances, tires, drums, containers, and electrical equipment containing hazardous materials. Fort Riley disposes its lime sludge, a focus of this EA, at the CDL within a monofill cell that is independently operated by the DPW.

4.1.3. Decommissioned Landfills

Fort Riley administers programs to protect and monitor closed landfills on the installation. Closed landfills, shown in Figure 4.1, are capped and re-vegetated. The Fort Riley Installation Restoration Program (IRP) manages the Southeast Funston Landfill, Southwest Funston Landfill, Custer Hill Landfill, Main Post landfills, and Forsyth landfills because those closed landfills are known to, or have the potential to, contain hazardous wastes. The IRP strictly controls all activities at those landfills, conducts monitoring activities for potential contaminant migrations off-site, and as necessary, mitigates or eliminates the impact of off-site contamination. The DPW Environmental Division's Pollution Prevention Branch (P2) manages two closed CDLs on-post: the Camp Whitside CDL and the Ellis Heights CDL. Staff of the P2 controls and monitors both closed CDLs.

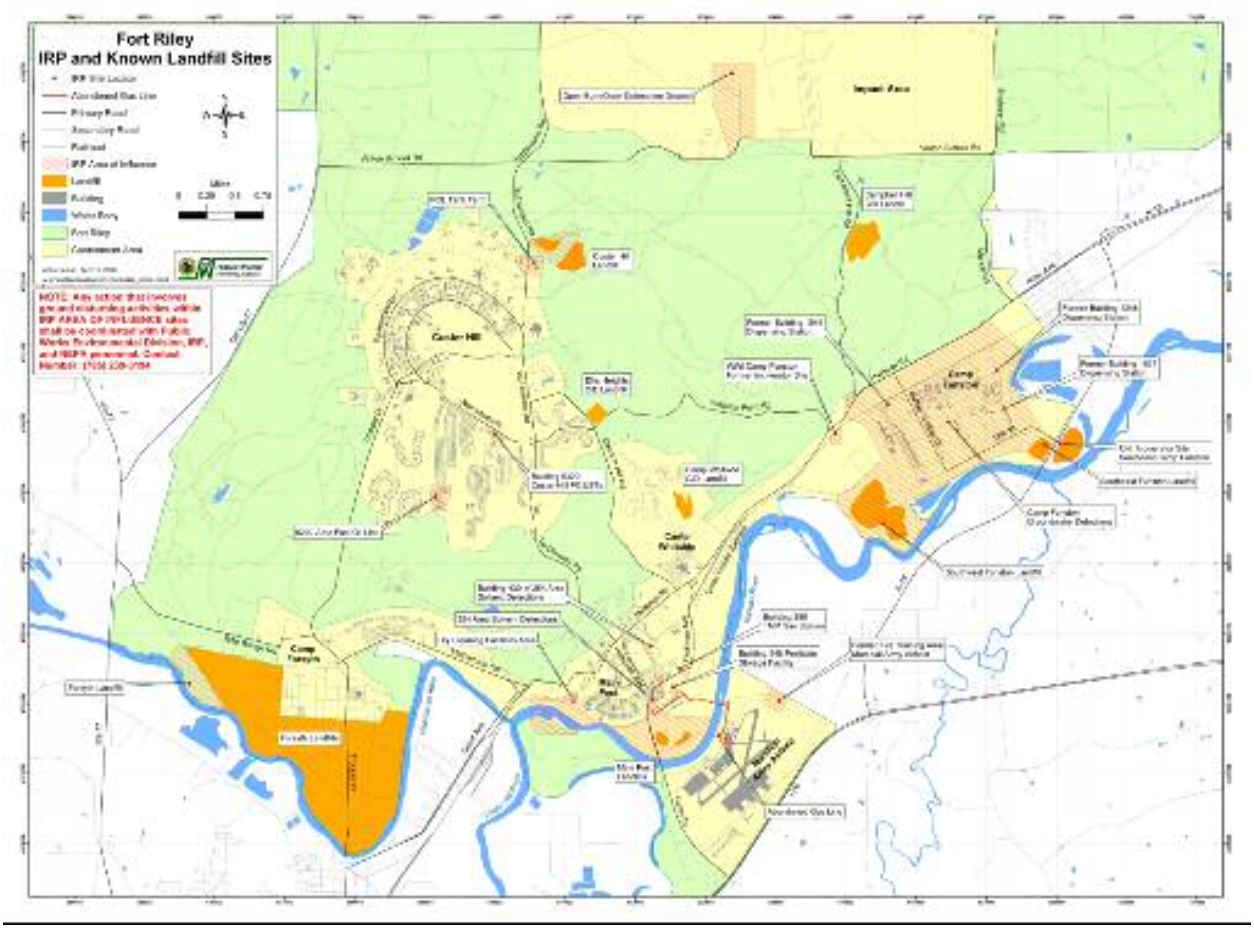

Figure 4.1 Existing and Former Fort Riley Landfill Sites

4.2. Lime Sludge Regulation and Safety

Residuals from drinking water treatment, such as lime sludge, are not specifically regulated at the federal level. However, if contaminants in lime sludge were to reach actionable levels, or when lime sludge has the potential to enter the environment, certain federal regulations can become applicable. Those regulations include the Clean Water Act (CWA); Criteria for Classification of Solid Waste Disposal Facilities and Practices (40 CFR, Part 257); the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Clean Air Act (CAA). The states establish and administer regulations that govern the requirements for water treatment plants and their residuals. Thus, the KDHE regulates Fort Riley's drinking water treatment and the disposal of liquids or sludges (including lime-softening sludge) from drinking water treatment. The KDHE requires no testing of lime sludge for contaminants prior to its disposal at a permitted monofill.

Fort Riley obtains raw water for DWTP processing from groundwater wells located in the southern portion of the installation, on the floodplain adjacent to the Republican River. The installation uses the lime softening process, which raises the pH of the untreated water by introducing hydrated lime [$Ca(OH)_2$] or quicklime (CaO) to precipitate calcium carbonate

($CaCO_3$), and sometimes magnesium hydroxide [$Mg(OH_2)$] (U.S. Army, DPW, 1995). Calcium carbonate and magnesium hydroxide are the primary contributors to water hardness, and their removal by precipitation softens water. Other ions, generally not present in significant quantities in water prior to treatment for drinking, may be removed by the softening process (National Drinking Water Clearinghouse, 1998a). Those ions include, but may not be limited to, iron, manganese, strontium, barium, zinc, and aluminum. Precipitated calcium carbonate and magnesium hydroxide, and water, form the major component of lime sludge. Other components include suspended solids from raw water and natural organic matter.

Sludge contaminants can include metals, un-reacted lime, suspended solids, and organics (National Drinking Water Clearinghouse, 1998b). Lime sludge is an alkaline waste. Accepted disposal methods for lime sludge include landfill disposal, sanitary sewer/wastewater treatment plant disposal, or land application.

4.3. Land Use

Fort Riley consists of 100,656 acres. Military maneuver and training activities at Fort Riley use 91,621 acres of training and range area or 91 percent of the total installation land area. The training areas and the firing ranges are used extensively throughout the year by soldiers assigned to Fort Riley as well as active Army units from other installations and U.S. Army Reserve, National Guard, and Air Force units. Military field training occurs within 100 designated training areas. Seventy-six of these are combined into 17 larger Maneuver Areas north of Vinton School Road comprising 70,926 acres. Figure 4.2 shows the Maneuver Areas and the Training Areas.

4.4. Air Quality

The subsequent discussion of air quality at Fort Riley includes the following subsections: National Issues, Regulatory Compliance and Classification, Air Quality Permits, Emission Sources, Notices of Violation, and Conformity Determination.

4.4.1. National Issues

The CAA, as amended in 1990 authorizes the U.S. Environmental Protection Agency (USEPA) to develop and implement programs to protect human health and enhance air quality. One program is the National Ambient Air Quality Standards (NAAQS), which set specific acceptable concentrations for six criteria pollutants (sulfur dioxide, carbon monoxide, ozone, nitrogen oxides, lead, and inhalable particulate matter). Ambient air is defined as the portion of the atmosphere, external to buildings, to which the public has access (40 CFR 50.1). Table 4.1 lists the current NAAQS. For each of the six criteria pollutants, USEPA has set health-based or "primary" standards to protect public health, and welfare-based or "secondary" standards to protect the environment (crops, vegetation, wildlife, buildings and national monuments, visibility, etc).

The CAA Amendments of 1990 (CAAA) defined air pollutant nonattainment areas and control requirements, expanded the list of Hazardous Air Pollutants (HAPs) to the current list of 188 pollutants, introduced technology-based control standards, established a new federal operating permit program, and addressed mobile source emissions, acid rain, and stratospheric ozone.

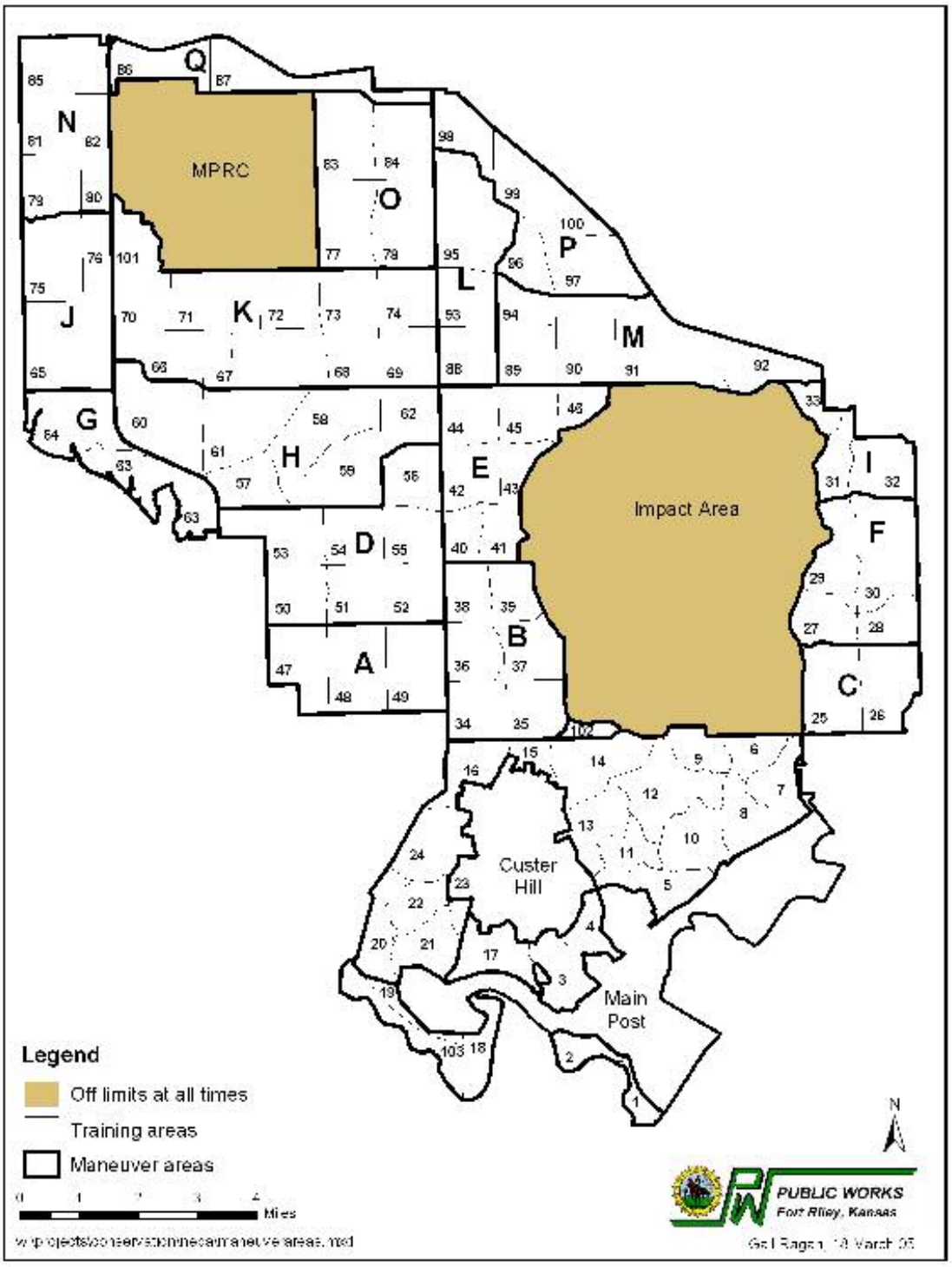

Figure 4.2 Fort Riley Maneuver and Training Areas

Table 4.1 National Ambient Air Quality Standards

Air Pollutant	USEPA Standard	Concentration	Remarks
(PM10)	Primary and Secondary Standard	50 micrograms per cubic meter	Annual arithmetic mean. The standard is attained when the expected annual arithmetic mean is less than or equal to 50 micrograms per cubic meter.
	Primary and Secondary Standard	150 micrograms per cubic meter	24-hour average concentration. The standard is attained when the expected number of days per calendar year, with a 24-hour average above 150 micrograms per cubic meter, is equal to or less than one.
Sulfur Dioxide	Primary Standard	80 micrograms per cubic meter (0.03 ppm[1])	Annual arithmetic mean.
	Primary Standard	365 micrograms per cubic meter (0.14 ppm)	Maximum 24-hour concentration not to be exceeded more than once per year.
	Secondary Standard	1,300 micrograms per cubic meter (0.5 ppm)	Maximum 3-hour concentration not to be exceeded more than once per year.
Carbon Monoxide	Primary Standard	10 milligrams per cubic meter (9 ppm)	8-hour average not to be exceeded more than once per year.
	Primary Standard	40 milligrams per cubic meter (35 ppm)	1-hour average not to be exceeded more than once per year.
Ozone	Primary and Secondary Standard	235 micrograms per cubic meter (0.12 ppm)	The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1. It should be noted that the one-hour standard would no longer apply to an area once USEPA determines that the area meets the one-hour standard. Instead, a new eight-hour standard would apply.
Nitrogen Dioxide	Primary and Secondary Standard	100 micrograms per cubic meter (0.053 ppm)	Annual arithmetic mean not to be exceeded.
Lead	Primary and Secondary Standard	1.5 micrograms per cubic meter	Maximum arithmetic mean averaged over a calendar quarter.

[1] ppm = parts per million

Source: 40 Code of Federal Regulation 50

4.4.2. Regulatory Compliance and Classification

Congress has stated that the prevention and control of air pollution belongs at the state and local level, thus the USEPA has delegated enforcement of Prevention of Significant Deterioration, New Source Performance Standard and Title V programs to KDHE. The KDHE has adopted the NAAQS by reference, thereby requiring the use of the standards shown on Table 4.1 within the State of Kansas. The KDHE implemented the Title V Operating Permit program through Article 28-19-500. The State of Kansas is divided into six Air Quality Control Regions (AQCRs). Fort Riley is located within the North Central Kansas Intrastate AQCR. An area that meets the NAAQS for a pollutant is classified as an "attainment" area for that pollutant, whereas an area that does not meet the NAAQS for a pollutant is classified as a "nonattainment" area for that pollutant. Ambient air quality for North Central Kansas is better than national standards for all six criteria pollutants.

4.4.3. Air Quality Permits

Fort Riley has two construction permits as listed on Table 4.2. In addition, a Title V Permit was issued by KDHE in 2004. Fort Riley is not a heavily industrialized facility, nor in a heavily industrialized region, and problems obtaining additional air permits, as needed, are not anticipated. The surrounding areas are primarily rural, with little or no heavy industry.

Table 4.2 Air Quality Permits at Fort Riley

Permit #	Permit Type	Source	Date of Issuance
1610001	Construction	1630/1633 Paint Booth	July 1, 1999
1610001	Construction	1630 Paint Booth and Abrasive Blast Booth	June 9, 2005
1610001	Operating	Fort Riley Facility	January 10, 2005
Source: Fort Riley			

4.4.4. Emission Sources

A comprehensive stationary source identification and emissions summary for Fort Riley was prepared in conjunction with the Title V operating permit application. The inventory portion of the project identified air emission sources, gathered information pertaining to material consumption and process operations, and obtained pertinent information for calculation of air pollution emissions. Source-specific emissions were derived from field data involving a variety of methodologies including emission factors, mass balance calculations, and computer models. The emission inventory only addressed stationary sources (no mobile sources). The sources identified during the inventory include those listed on Table 4.3.

Tank activities are conducted primarily at the Douthit Multi-Purpose Range Complex (MPRC), with some use of Range 18. These activities consist of tactical tank movements in combination with weapons fire, or fire potential, to simulate battlefield conditions. Other activities, including

cross-country training movements, are conducted within the Training and Maneuver Areas. Emissions of particulate matter result from driving/training on unpaved roads.

Kansas air regulations require Fort Riley to submit an annual air emissions inventory to KDHE by June 1 for the prior calendar year. The inventory summarizes stationary air pollution sources and emissions at the installation. Source descriptions, emission calculation techniques, and sample calculations are provided for each source category. Based upon the emissions inventory, total HAP emissions and volatile organic compound (VOC) emissions from both stationary and fugitive sources are within established standards.

Table 4.3 Fort Riley Emission Sources

Boilers/Heaters	Stationary Internal Combustion Engines	Abrasive Blasting
Surface Coating	Ozone Layer Depleting Substances	Degreasing
Woodworking	Landfills	Firing Range
Welding	Pesticide / Herbicide Application	Water Treatment
Wastewater Treatment	Road Dust	Structural and Road Painting
Open Burning / Open Detonation	Miscellaneous Chemical Usage	Earth Borrowing
Wildfires and Prescribed Burning	Fuel Storage and Dispensing	
Road Paving	Graphite/Smoke Generators	
Source: Fort Riley		

4.4.5. Notices of Violation

Fort Riley is under the jurisdiction of USEPA Region VII and the KDHE. The KDHE conducts annual compliance inspections – the most recent was August 22, 2006. No violations were observed at the time of the inspection. In addition, Fort Riley regularly performs internal Army Environmental Performance Assessment System audits each year. Based on these two audit mechanisms, the installation has implemented the required programs to maintain compliance with federal and state air regulations.

4.4.6. Conformity Determination

There are two independent legal requirements that are used to determine air quality impacts. The first governing requirement is the NEPA and the second is the General Conformity Provision per the CAA, Section 176. Fulfillment of one requirement does not fulfill the other requirement, nor does the exemption of one automatically exempt the other. NEPA requires consideration of the

direct and indirect effects of an action on the environment through a prescribed documentation process. Completion of this EA fulfills the NEPA air quality analysis requirements.

Federal regulations (40 CFR, Part 51, Subpart W) establish General Conformity Provision requirements for federal facilities to ensure that activities do not adversely affect the State Implementation Plan goals. Conformity is aimed at preventing a federal action from contributing or causing a violation of the NAAQS, increasing the frequency of an existing violation, or delaying the timely attainment standard. The National Highway System Designation Act of 1995, Section 305 (Public Law 104-59) modified the CAA, Section 176 preventing the applicability of General Conformity to attainment areas. Therefore, the General Conformity Rule is only applicable to non-attainment and maintenance areas. The General Conformity Rule does not apply because Fort Riley is located in an attainment area for all criteria pollutants.

4.5. Soils

Fort Riley is part of the Great Plains Winter Wheat and Range Soil Resource Region. This region is covered with a foot or less of windblown material or loess. The loess rests upon alternating layers of weathered limestone and shale. Most soils are friable, silty loam 6 to 12 inches thick, overlying nearly impervious clays. Fort Riley's soils developed residually from parent materials and from other parent materials carried by water or wind and deposited at the installation. The permeability of installation soils varies from excessively drained sandy lowland soils to tight clays with very slow permeability. Bedrock depths under these soils vary from less than one foot in upland areas to 40 to 60 feet in many areas of Main Post.

The USDA Natural Resources Conservation Service (NRCS) (1996) mapped 36 soil series on Fort Riley and taxonomically categorized them into six soil associations. A simplified soil type map of Fort Riley is shown as Figure 4.3.

Geary silt loam, often found on broad ridge tops, comprises the majority of the upland site proposed for the monofill. The bluff-top location overlooks Forsyth Family Housing to the south. Geary silt loam, a well-drained loess soil with moderate permeability, typically supports grassland vegetation. Currently, the site is vegetated with grasses and other herbs. Visual evidence indicates that installation personnel once mined, or “borrowed”, topsoil from the site. The NRCS rates Geary silt loam as “not limited” for landfill use, which means that the soil has features that are very favorable for monofill construction. Operators would expect good performance and low maintenance from Geary silt loam used to construct the monofill.

Clime-Sogn complex comprises the soil at the margins of the proposed site for the monofill. Clime-Sogn complex soils are moderately deep to shallow, sloping and moderately steep silty clay loams on uplands. The lack of soil depth and the slope position of these soils make them subject to severe erosion if unprotected. The NRCS rates Clime-Sogn complex as “very limited” for landfill use. Thus, the design of the monofill avoids excavation activities and the installation of key monofill features at the site’s margins. Fort Riley plans only to overlay fill for the toe of the perimeter berm and to install fencing at the margins of the site.

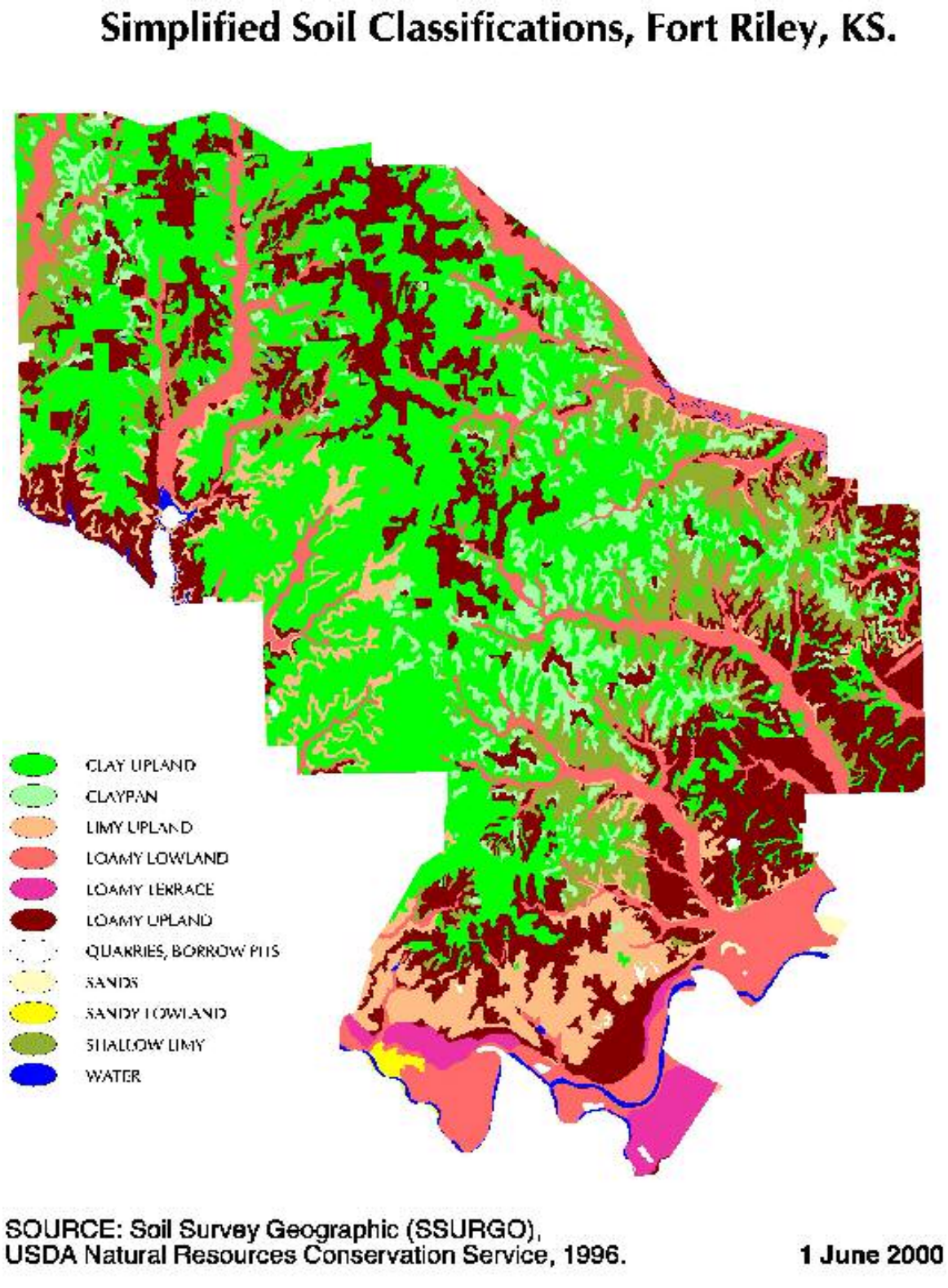

Figure 4.3 Fort Riley Soil Types

4.6. Water Resources

Waters on Fort Riley are surface water in rivers, other perennial and intermittent streams, ponds and lakes, and ground water aquifers. The Republican and Kansas Rivers form the southern boundaries of Fort Riley. With the exception of oxbow lakes, the 174 lakes and ponds on Fort Riley are man-made impoundments. Aquifers receive water through alluvial deposits of streams and rivers, porous surface deposits, and fissured limestone in uplands by means of infiltration of rain and seepage from rivers into limestone and shale. Surface waters and nearby off-post waters are shown in Figure 4.4.

4.6.1. Groundwater

Groundwater aquifers occur in the alluvial deposits of the major streams and rivers, in the porous surface deposits, and in the fissured, near-surface limestone of the upland areas. Saturated, water-bearing sediments in the Kansas River valley range from zero to 90 feet in thickness. Well yields of 300 to 1,000 gallons per minute are obtained from aquifer thicknesses of 20 to 40 feet, and yields in excess of 1,000 gallons per minute can be obtained where aquifer thicknesses exceed 40 feet.

Moderate quantities of groundwater occur in the bedrock formations of the area, in particular the Fort Riley and Florence Limestone Formations. Where these limestones are fractured and/or contain solutioned cavities, well yields of 100 gallons per minute or more can be obtained. Wells that penetrate shales in the upland area will generally yield up to several gallons per minute.

Discharge from the valley-fill sediments, the major water-bearing deposits, is by seepage to major streams, evapotranspiration, and withdrawal by wells. Recharge of these deposits is by direct infiltration of precipitation, seepage from streams and ponds, return flow from irrigation, and seepage from the bedrock formations that border and underlie the valley.

4.6.2. Surface Water

Surface waters at Fort Riley are located within the Kansas River basin and consist of rivers, perennial and intermittent streams, ponds, and lakes. Nearly 145 miles of rivers and streams, consisting of 14 miles of rivers and 131 miles of streams, are present on Fort Riley. All 14 streams are intermittent except for Wildcat, Sevenmile, Madison, and Timber Creeks. Streams in the southern portion of Fort Riley drain to the south to the Republican or Kansas Rivers, which form the installation's southern boundary. Streams in the western portion of Fort Riley drain toward the southwest to Milford Lake on the Republican River. Streams in the northeastern portion of Fort Riley drain to Wildcat Creek, a perennial stream that runs along the northeastern boundary of the installation. Wildcat Creek ultimately drains to the Kansas River south of Manhattan.

4.6.3. Wetlands

Wetlands are defined as "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR Part 328.3 (b); 40 CFR Part 230.41 and Part 230.3).

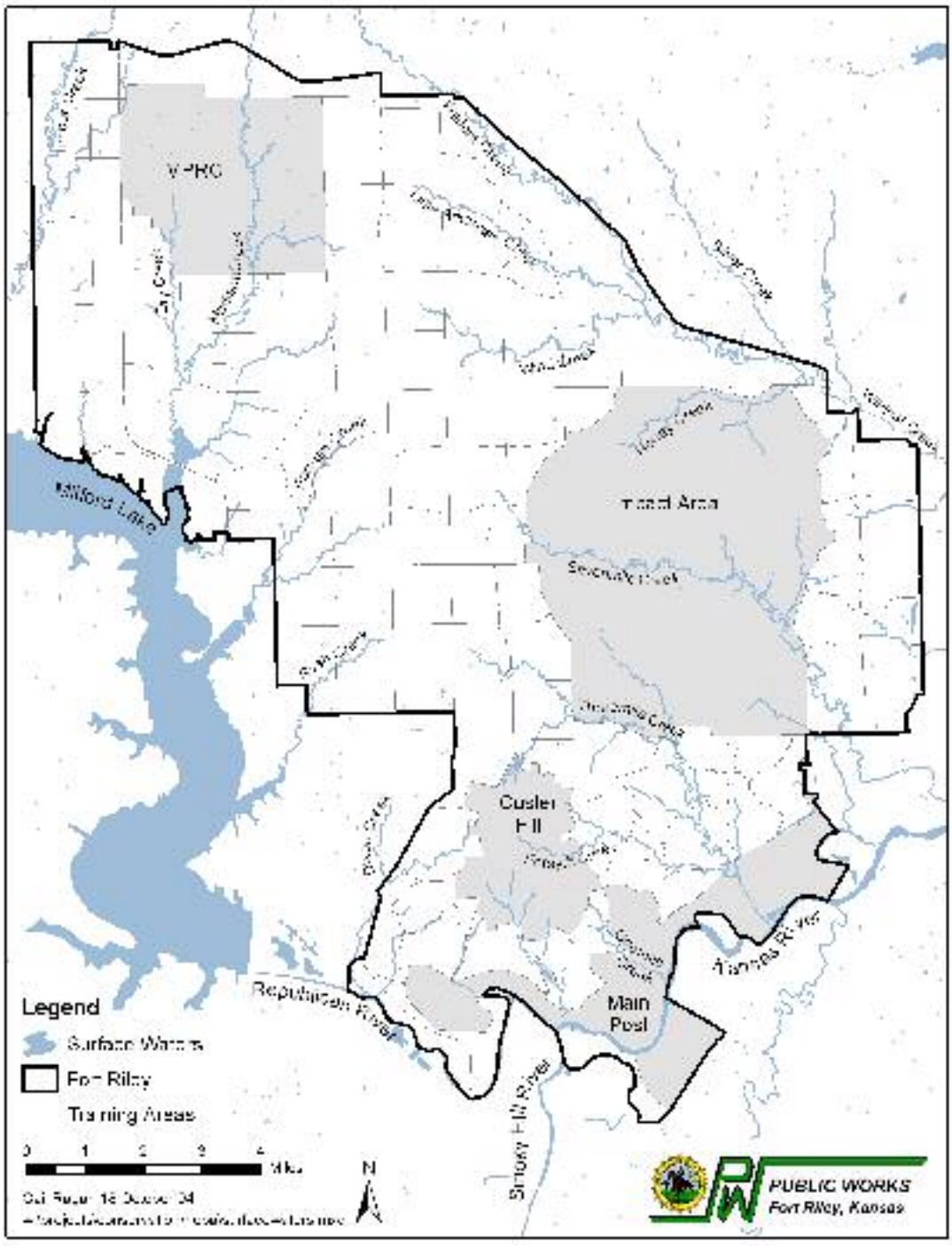

Figure 4.4 Fort Riley Surface Waters

Wetland areas on Fort Riley include springs and seeps, streams, rivers, ponds and lakes, low areas behind terraces in abandoned crop-fields, and emergent marshes along the periphery of waterbodies, such as those within the Madison Creek and Farnum Creek arms of Milford Lake. In 1991, the U.S. Fish and Wildlife Service (USFWS) documented approximately 1,449 acres of wetlands. Approximately another 84 acres have been constructed since the inventory (total 1,533 acres in 2002). Of this total, 972 acres are considered permanently inundated. Riverine habitat comprises 145 miles and encompasses 748 acres.

4.7. Flora and Fauna

DoD and Army Policies are to manage natural resources through an ecosystems approach that emphasizes the maintenance and integrity of native biodiversity. The management of entire flora and faunal communities is the core of ecosystems management. Thus, the EA describes biotic resources in terms of communities.

4.7.1. Floral Communities

This region consisted of tall- and mixed-grass prairies dominated by big bluestem, indiangrass, and switchgrass under natural conditions (Kuchler, 1974). The pre-settlement prairie was maintained through periodic wildfires and grazing by herbivores. Woodlands were present within moist bottomlands of floodplains and along perennial stream corridors. However, past and current land management practices, such as the suppression of wildfires, the introduction of agriculture and stock grazing, and the construction and expansion of military facilities, have resulted in the establishment and expansion of several vegetation classes at Fort Riley. Figure 4.5 shows the coverage of four broad categories of land cover type on the installation. These categories are grassland, woodlands and forests, water, and urban areas.

The results of a 2004 Kansas Biological Survey (KBS) study of the vegetation of Fort Riley indicate that more than 80 families and nearly 520 species of plants are present on the installation (Freeman and Delisle, 2004).

4.7.1.1. Grasslands

Approximately two-thirds of Fort Riley is grassland that conforms to one of two basic types: native prairie or "go-back" grasslands. Areas designated as "go-back" are grasslands established on lands that were once cultivated. It is estimated that about 40% of Fort Riley grassland is native prairie, and that the remaining 60% is "go back" grassland (or highly disturbed grassland).

The native grasslands of Fort Riley consist primarily of tallgrass prairie. Some elements of the mixed-grass prairie exist because Fort Riley is located near the transition zone between the tallgrass prairie and the mixed-grass prairie to the west (Kuchler, 1974).

The native grasslands on Fort Riley generally do not exhibit dominance patterns of big bluestem, indiangrass, switchgrass, and mid-grasses, such as little bluestem and sideoats grama. Past land use and management, and military training exercises have produced native grasslands intermixed with woody species. Grasses, such as tall dropseed, tall witch grass, and foxtail, increase as a result of disturbance. The grasslands with the least soil disturbance contain the highest percentages of native warm-season grasses, such as those mentioned above, and associated forbs (U.S. Army Corps of Engineers, 1991).

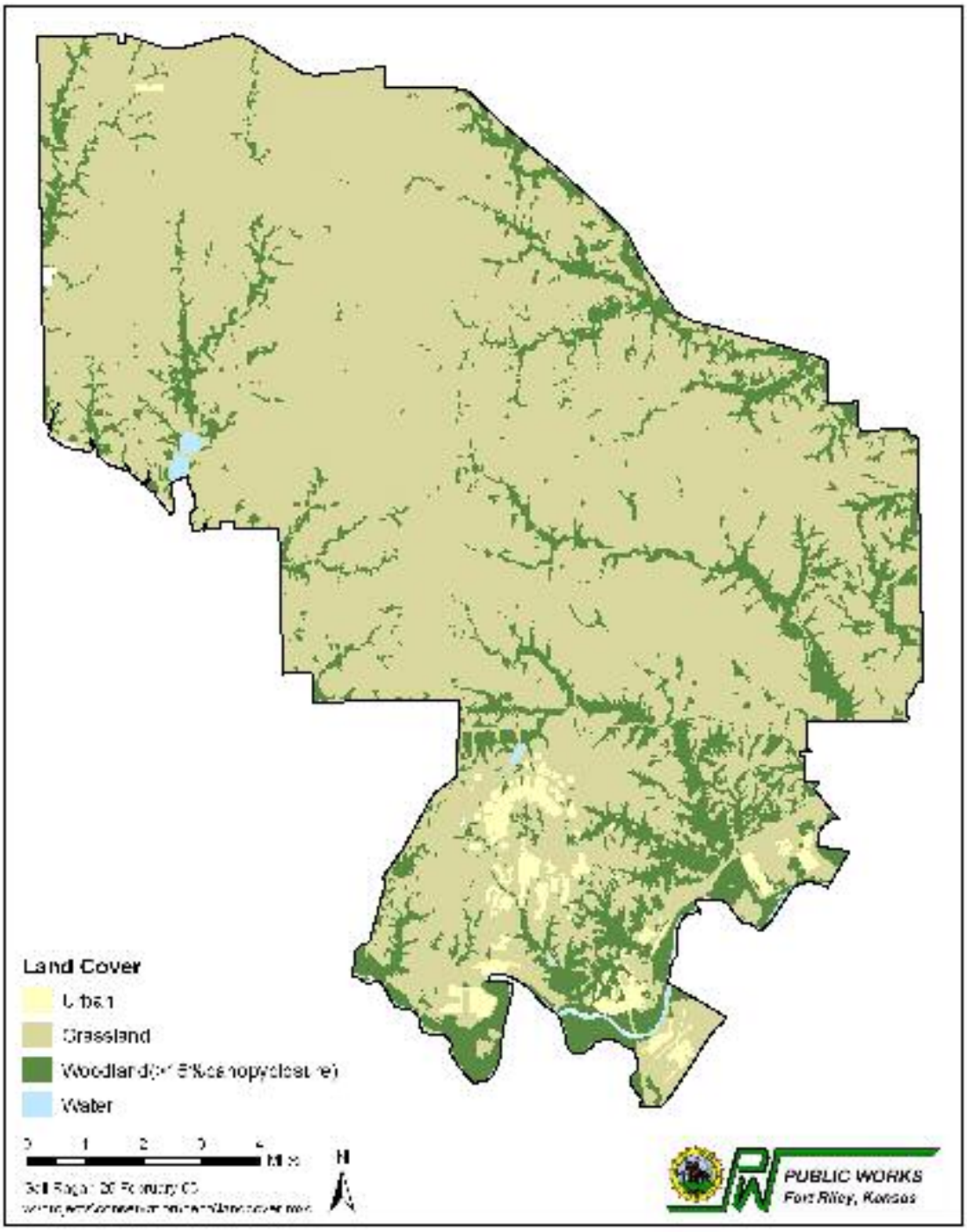

Figure 4.5 Fort Riley Land Cover Types

Some of the “go-back” grassland areas on Fort Riley ceased to be cultivated prior to their acquisition by the Army. Most ceased to be cultivated after acquisition. The “go-back” lands are in various stages of ecological succession. Early seral stages consist of annual grasses (prairie threeawn, green bristlegrass, Japanese brome). Forbs (Missouri goldenrod, daisy fleabane, snow-on-the-mountain, western ragweed) are present in areas that continue to have frequent vehicular traffic (e.g., parts of Maneuver Areas A, D, B and E).

Other “go-back” grassland areas not as frequently or intensively impacted by military vehicles are in slightly further developed seral stages. Dominant species in these areas are those typically occurring in the post's native grasslands or cool season perennial “tame” grasses (mainly smooth brome and lesser amounts of tall fescue) or mosaics of native tallgrass prairie species and perennial cool season “tame” grasses. More than 75% of Maneuver Area O consist of “go-back” and disturbed, but not previously cultivated, grasslands. In addition, Maneuver Areas D, H, and K each have more than 2,500 acres of “go-back” land primarily in their eastern portions.

4.7.1.2. Shrublands

Extensive areas of shrubland are not a historic feature of the prairie environment. The reduction in wildfires and grazing practices employed prior to the installation's acquisition by the federal government, as well as the abandonment of cropfields upon the area's acquisition and subsequent fire suppression efforts, has contributed to the establishment of shrublands on Fort Riley. Nevertheless, shrublands remain a minor component of the installation’s landscape, covering no more than 2 to 5 percent of the post.

Shrublands are located along the edges of woodlands, and in isolated patches along the smaller intermittent drainages and ravines, and sheltered areas within grasslands. The vegetation represents a successional stage between grassland and young woodland. The most common species include American plum, rough-leaved dogwood, smooth sumac, buckbrush, eastern red cedar, Arkansas rose, and smaller individuals of hackberry, American elm, and other trees.

4.7.1.3. Forestlands

Forestlands comprise approximately 16,400 acres of Fort Riley. Most of this acreage is associated with the bottomland forests along the Republican and Kansas Rivers and the woodlands within the drainages of Threemile, Sevenmile and Wildcat Creeks. The bottomland forests along the Republican and Kansas Rivers have a tall canopy formed by cottonwood, hackberry, green ash, red mulberry, sycamore, American elm, red elm, bur oak, chinquapin oak, and black walnut. The understory of these woodlands consists of woody shrubs or herbaceous cover.

Forests within higher elevations in smaller stream valleys and ravines are dominated by bur oak and chinquapin oak, American elm, red mulberry, bitternut hickory, black walnut, green ash, and honey locust on the lower slopes with the upper regions of some of these sites producing savanna type vegetation. The understory consists of grasses, forbs, shrubs, and young canopy species with varying densities and dominance patterns. Pole-size stands at higher elevations near the heads of drainages and in isolated patches are dominated by hackberry and American elm mixed with shrubs, forbs, and grasses. Upland forests are more extensive in the north and east aspects than in the south or west.

Twenty-eight tree species have been recorded on Fort Riley. A Forest Inventory conducted 1997-1998 showed the most common species were (in descending order) American elm (21.6%),

hackberry (19.4%), and chinquapin oak (9.1%). The median forest tree was eleven inches Diameter at Breast Height (DBH) and was just less than 40 feet tall and about 40 years old. Most stands had a considerable number of pole size trees and were relatively young; only five of the 292 trees aged were more than 100 years old. Twenty percent of the trees were saleable, but they fell predominantly in the 16-20 inch DBH class. A significant portion (7.4%) of the standing trees in forest plots were snags, and nearly a quarter of the post's woodlands had excessive basal area (over 100 square feet per acre), which would require some form of thinning to maintain forest health.

Most areas contain mixed species, but some have primarily chinquapin oak or hackberry. The most common species of woody regeneration are American elm (24%) and hackberry (18%). Species composition, however, is generally shifting from an oak and hickory composition to nearly pure stands of hackberry. Although the regenerating hackberry is less abundant than American elm, hackberry is generally present in larger size classes than elm. The primary factor for the species change is lack of disturbance in forest stands. This allows shade tolerant hackberry to rise from the understory to codominance.

The most common non-tree plants in the understory are rough-leaved dogwood (19%), Virginia creeper (12%), buckbrush (9%), and poison ivy (8%), and the average height of understory plants is just over three feet. Approximately one percent of the understory vegetation in woodland plots is listed by Kansas as a noxious weed, the principal one being sericea.

Most stands (83%) have minimal fuel-loading levels. The remaining stands have a moderate fuel loading level (fuels would burn from 1-10 hours).

4.7.1.4. Savannas

Fort Riley's ecosystem has natural components that are not unlike those in savannas, which are often considered ecotones between forests and grasslands. Savannas are areas that have tree canopy coverage from 5-15%, are 1 acre or more in size, have associations with typical prairie vegetation, and have canopies that are typical of open-grown trees. Savanna vegetation composition and density are mainly determined by fire. Consequently, the pattern and extent of present savannas depend on recent fire histories and the land's geomorphology. Most sites on Fort Riley meeting the above criteria for a savanna are in Maneuver Areas A, D, J, and N (Figure 4.2). The total area of savanna sites on Fort Riley is approximately 450 acres.

A survey of Fort Riley's savannas was completed in 1999, and it showed more than one-fourth of the plots surveyed have significant visible fire indicators on the trees. Fort Riley's savannas have an average of 25 trees per acre. Thirteen tree species were recorded. The most common are hackberry (33%), American elm (22%) and green ash (12%). Sixty-two species of understory plants exist in Fort Riley's savannas; the most common are smooth bromegrass (37%), big bluestem (12%), Japanese bromegrass (5%), and little bluestem grass (5%). Notably, noxious weeds are very rare on the savanna sites (0.1%).

4.7.1.5. Croplands

Croplands are a minor component of the Fort Riley ecosystem. Approximately 1,422 acres are located along much of east, north, and west boundaries and are leased to local farmers. Approximately 500 additional acres of croplands serve as wildlife foodplots throughout the installation.

4.7.2. Faunal Communities

Fort Riley habitat supports at least 43 species of mammals, 223 species of birds, 44 species of reptiles and amphibians, and 51 species of fish (U.S. Army, DES, 2001; Pitts et al., 1987; U.S. Army Corps of Engineers, 1991; U.S. Fish & Wildlife Service, February 1992; Busby, et al., 1994; Quist, 1999). Many of these species are year-round residents although most of the birds are seasonal migrants.

4.7.2.1. Game Animals and Furbearers

Fort Riley supports viable populations of all of the typical game species found in this region of Kansas, as well as the only huntable elk population in the state (1998 to present). Upland game birds include bobwhite quail, ring-necked pheasant (the only exotic terrestrial game species on Fort Riley), prairie-chicken, turkey, mourning dove, and woodcock. In addition, a variety of ducks is common. Fox squirrels and cottontail rabbits are common; gray squirrels are uncommon; and jackrabbits are rarely seen. Those species, which the state defines as "big game" on Fort Riley, are white-tailed deer, mule deer (rarely present), and elk. Furbearer species are badger, bobcat, mink, muskrat, opossum, raccoon, red fox, gray fox, striped skunk, coyote, and beaver. Principle game species and furbearers are described below.

4.7.2.2. Non-Game Animals

Twenty-four species of non-game mammals have been documented to occur on Fort Riley. Forty-four species of reptiles and amphibians (19 species of snakes, 9 lizards, 7 turtles, and 9 amphibians) have been observed on Fort Riley. The most common species are the ringneck snake and the western chorus frog.

Numerous inventories conducted have documented 51 species of fish in Fort Riley's streams, lakes, and ponds. Thirty-four species have been found in the Kansas, Smokey Hill and Republican Rivers. Fish assemblages in ponds and lakes are largely represented by species managed for recreational fishing. Inventories of aquatic insects and mussels have been conducted in Fort Riley's perennial streams. Nineteen orders/families of aquatic insects and evidence of 17 species of mussels have been documented. Seven of these mussel species were found extant. The other 10 mussel species have apparently been extirpated from the installation.

4.7.2.3. Migratory Birds

Numerous inventories of birds have been conducted on Fort Riley, resulting in the observation of 223 species, most of which are migrant, non-game passerines. Many of these species are Neotropical Migrant Birds (NTMBs). Birds occupy a wide range of habitats on the installation, from riverine sandbars to interior woodlands.

Grassland birds have experienced the most severe decline in population of any type of land bird in North America. Fort Riley's predominant cover type is grassland, and provides habitat for some grassland species in decline throughout their range. Fort Riley also contains substantial woodland habitat. These woodlands have been found to attract NTMBs that are characteristic of interior woodland tracts. Many species of interior woodland NTMBs have experienced population declines throughout their ranges. Historically, little effort has been directed toward specific management of nongame birds that are not protected by federal or Kansas endangered species laws. However, the DoD and the Army place special emphasis on protecting NTMBs

through participation in the Partners in Flight program, and strongly advocates their management.

The take or possession of migratory birds by the Environmental Division, DPW and U.S. Department of Agriculture-Wildlife Services (USDA-WS) is conducted under federal and state permits. The USDA-WS possesses a federal "Special Purpose" permit that allows the take of migratory birds (except bald or golden eagles and other threatened or endangered species). The permit also authorizes retrieval and possession of injured migratory birds "including eagles". The USDA-WS also possesses a State of Kansas Scientific, Education or Exhibition Permit that allows the collection of all native Kansas species, including any sick, injured, or otherwise incapacitated migratory bird species, or body parts and carcasses thereof. The Environmental Division, DPW possesses a State of Kansas Scientific, Education or Exhibition Permit as well.

4.7.3. Threatened and Endangered or Rare Species

Numerous systematic surveys conducted since 1990 have documented the presence of thirteen federally and/or state-listed T&E species, and 23 rare species (Table 4.4). Nine other listed or rare species have never been observed but could possibly occur on Fort Riley. Rare species are those designated by the USFWS as "Species of Concern" (SOC) or the Kansas Department of Wildlife and Parks (KDWP) as "Species in Need of Conservation" (SINC). These designations confer no legal protection under the Endangered Species Act or the Kansas Nongame and Endangered Species Conservation Act.

Table 4.4 Federally- and State-listed Species and Other Rare Species That Occur or Could Occur on Fort Riley

Species	Federal	State	Possibility on Fort Riley
Baird's sparrow, *Ammodramus bairdii*	SOC		Possible
Bald eagle, *Haliaeetus leucocephalus*	T	T	Winter resident – possible nesting
Bobolink, *Dolichonyx oryzivorus*		SINC	Migrant
Black rail, *Laterallus jamaicensis*	SOC	SINC	Migrant
Black tern, *Chlidonias niger*	SOC	SINC	Migrant
Eskimo curlew, *Numenius borealis*	E	E	Possible
Ferruginous hawk, *Buteo regalis*	SOC	SINC	Migrant - possible winter resident
Golden eagle, *Aquila chrysaetos*		SINC	Transient
Henslow's sparrow, *Ammodramus henslowii*	SOC	SINC	Summer resident
Least tern, *Sterna antillarum*	E	E	Migrant – possible nesting
Loggerhead shrike, *Lanius ludovicianus*	SOC		Resident
Northern goshawk, *Accipiter gentiles*	SOC		Transient
Peregrine falcon, *Falco peregrinus*		E	Migrant
Piping plover, *Charadrius melodus*	T	T	Migrant – possible nesting
Red-shouldered hawk, *Buteo lineatus*		SINC	Transient
Short-eared owl, *Asio flammeus*		SINC	Possible
Snowy plover, *Charadrius alexandrinus*		T	Migrant

Species	Federal	State	Possibility on Fort Riley
Western burrowing owl, *Athene cunicularia*	SOC		Migrant
Whip-poor-will, *Caprimulgus vociferous*		SINC	Summer resident
White-faced ibis, *Plegadis chihi*	SOC	T	Migrant – possible nesting
Whooping crane, *Grus Americana*	E	E	Possible
Southern bog lemming, *Synaptomys cooperi*		SINC	Resident
Eastern spotted skunk, *Spilogale putorius*		T	Possible
Eastern hognose snake, *Heterodon platirhinos*	SOC	SINC	Possible
Timber rattlesnake, *Crotalus horridus*		SINC	Possible
Western hognose snake, *Heterodon nasicus*		SINC	Resident
False map turtle, *Graptemys pseudogeographica*	SOC		Resident
Texas horned lizard, *Phrynosoma cornutum*	SOC		Resident
Blue sucker, *Cycleptus elogatus*	SOC	SINC	Resident
Paddlefish, *Polyodon spatula*	SOC		Possible
Plains minnow, *Hybognathus placitus*	SOC	SINC	Confirmed
Sturgeon chub, *Macrhybopsis gelida*	SOC	T	Possible
Topeka shiner, *Notropis Topeka*	E	T	Resident
American burying beetle, *Nicrophorus americanus*	E	E	Possible
Prairie mole cricket, *Gryllotalpa major*	SOC	SINC	Resident
Regal fritillary butterfly, *Speyeria idalia*	SOC		Resident
Western prairie fringed orchid, *Platanthera praeclara*	T	NA	Possible

E = Endangered, In danger of extinction throughout all or a significant portion of its range.

T = Threatened, Likely to become endangered within the foreseeable future.

P = Proposed, Proposal to be listed as either endangered or threatened published in Federal Register.

SOC = Species of Concern, Require additional information to determine if listing is warranted.

SINC = Species in Need of Conservation, Questionable ability to be self-sustaining species in Kansas.

Possible = Habitat is present and species range overlaps the area but the species is not documented on FRK.

4.7.3.1. Plant Species

The only plant species federally listed as threatened or endangered that possibly may exist on Fort Riley is the western prairie fringed orchid. However, it has not been found despite systematic surveys.

4.7.3.2. Animal Species

Four animals found on Fort Riley are federally and state-listed species. Three are birds: the bald eagle, least tern, and piping plover, none of which are year-around residents. The bald eagle winters on Fort Riley, and the other two species are uncommon migratory transients. All species generally use the major rivers and reservoir areas around the periphery of the post.

The Topeka shiner, a small fish, is the fourth species and the only federally listed species on Fort Riley year-round (Quist, 1999). It is found in Wildcat, Sevenmile, Wind, Little Arkansas, and Honey Creeks, all of which are streams on the east side of the installation. It has not been found in other Fort Riley streams despite systematic surveys.

Twenty-three animal species considered rare are present on Fort Riley. Most of these are birds, five are reptiles or amphibians, three are riverine fish, two are insects, and one is a mammal. Details pertaining to the management of the four federally listed and a recently delisted species (peregrine falcon) present on Fort Riley are contained in the installation's ESMP (U.S. Army DES, 2004).

4.7.3.3. Listed Habitats

There is no federal threatened and endangered species critical habitat on Fort Riley. However, the state has designated critical habitat on post for five species: bald eagle, piping plover, least tern, sturgeon chub, and Topeka shiner. All lands and waters within five air miles of public lands around Milford and Tuttle Creek reservoirs are listed by the state as bald eagle critical habitat. In addition, all water and lands within a 100-yard corridor along the main stem of the Kansas, Republican and Smokey Hill Rivers from the rivers' normal high watermark are listed. All waters within the corridor along the main stem of the Kansas River have been listed as state-designated critical habitat for the least tern and piping plover. State-designated critical habitat for the sturgeon chub is the main stem of the Kansas River from its confluence with the Republican and the Smoky Hill rivers to its confluence with the Missouri River. Stretches along Wildcat, Little Arkansas, and Sevenmile Creeks are state-designated critical habitat for the Topeka shiner. During the spring of 2003, stream surveys conducted in Honey Creek yielded Topeka shiners. Pending legislation to officially state-designate Honey Creek as critical habitat for Topeka shiner, the stream is currently treated as state-designated critical habitat by the KDWP.

4.8. Cultural Resources

Cultural resources include any prehistoric or historic district, site, building, structure, or object significant in American history, architecture, archeology, engineering, or culture that is listed in or potentially eligible for listing in the National Register of Historic Places (NRHP). Cultural Resources include artifacts, records, and material remains related to such a property or resource. Fort Riley is responsible for identifying and protecting significant archeological and architectural resources in order to comply with the National Historic Preservation Act (NHPA) of 1966, as amended, and the Archaeological Resources Protection Act (ARPA) of 1979. A number of cultural resource surveys inventorying and documenting archeological and architectural resources have been conducted on Fort Riley.

Fort Riley's Main Post area was listed as a National Register Historic District in the NRHP in 1974. Nearly 300 historic buildings and structures are present in the district. These include officer and enlisted soldiers quarters, barracks, historic hospitals, stables, headquarters, supply buildings, garages, and pump houses. In addition to the standing structures listed on the NRHP, the Main Post Historic District (MPHD) also includes 102 archeological sites and numerous historic landscapes. The first Territorial Capitol Building of Kansas is located near the Kansas River on Fort Riley and is independently listed on the NRHP. The locations of 249 prehistoric,

706 historic and 29 multi-component (prehistoric/historic combination) sites have been identified on Fort Riley outside of the MPHD.

A Programmatic Agreement (PA) among the Department of the Army (DA), Fort Riley, the Kansas State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP) addresses activities at the installation that affect historic properties included in or potentially eligible for inclusion in the NRHP (U.S. Army DES, 1997). The PA ties together the more specific management practices and activities that the installation had been accomplishing under several individual management plans and agreements. These other plans and agreements include the following:

- The installation's Integrated Cultural Resources Management Plan (ICRMP), which provides a programmatic basis and guidance for the management and preservation of cultural resources in accordance with the Archeological Collections Management Recommendations (CERL, 1996).
- The Comprehensive Agreement Regarding Inadvertent Discovery and Intentional Excavation of Native American Human Remains and Cultural Items for which the (Kaw or Pawnee) Nation May Have Priority of Custody Within Lands Owned or Controlled by the U.S. Army at Fort Riley, Kansas. This agreement covers the treatment of Native American Human Remains and Cultural Items as defined by the Native American Graves Protection and Repatriation Act (NAGPRA).
- The Historic Landscape Inventory for the Main Post and Fort Riley, Kansas (CERL, 1992), which provides the installation with a brief analysis regarding the evaluation of eleven landscapes on Main Post and vicinity relating to the NHPA.
- The Historical and Architectural Documentation Report (CERL, 1993), which was produced to assist in the effective management of historic structures present at Fort Riley. The report includes: the Historic American Buildings Survey Level IV inventory results; an historical overview of Fort Riley; recommendations for the establishment of NRHP districts and thematic groups within the districts at Fort Riley; and a management overview of the recommendations made.

Pursuant to Section 110 of the NHPA, Phase I archeological and architectural surveys at Fort Riley are ongoing to provide a complete inventory of prehistoric and historic cultural resources. The ICRMP also identifies and evaluates treatment or protection standards that would ensure the preservation and/or reduction of adverse effects on significant historic properties (e.g., districts, buildings, structures, objects, and archeological sites).

4.9. Sociological Environment

This section considers the sociological attributes potentially affected by the Proposed Action. The EA describes the following attributes:

- The demographics of Fort Riley and its Region of Influence (ROI)
- Economics
- Visual and aesthetic values
- Recreational activities

Fort Riley drafted and published this EA during a period of great change at the installation: local implementation of the Army-wide Army Modular Force (AMF), Base Realignment and Closure (BRAC), and Integrated Global Presence and Basing Strategy (IGPBS) initiatives. During late 2006 and early 2007, the population of Fort Riley and its economic environment changed continuously, complicating the effort to describe those aspects in this document. The information that follows in sections 4.9.1 and 4.9.2, about demographics and economics in the Fort Riley region, is based on data from 2000-2005. Thus, it describes the baseline condition prior to the ongoing transformation and population growth of Fort Riley, with a projected end-state of approximately 18,000 Soldiers.

4.9.1. Demographics

Fort Riley lies in portions of Geary, Riley, and Clay counties. The nearest communities to the installation are Grandview Plaza, Junction City, Manhattan, Milford, Ogden, Riley, Wakefield, Bala, and Keats. The area of socioeconomic impact, influenced by Fort Riley, extends beyond Geary, Riley, and Clay counties.

Fort Riley's presence has had a measurable impact upon the overall population and employment levels surrounding the installation. The following sections describe the current demographics and demographic trends for Fort Riley and the surrounding area, defined as the ROI.

4.9.1.1. Fort Riley Population

Fort Riley supports a population of more than 28,570, composed of 10,060 Soldiers, 12,714 family members, and 5,805 civilian employees (Plans, Analysis, and Integration Office, FY05). Nearly 15,400 Soldiers and family members live on post. Another 19,752 retirees are dependent on Fort Riley services. The civilian workforce consists primarily of DA appropriated funds employees, DA non-appropriated funds employees, contractors, school employees, Army – Air Force Exchange System employees, and tenants. The majority of the off-post military personnel reside in Junction City or Manhattan.

Fort Riley processed approximately 15,100 annual, weekend, or mobilized reserve component trainees during Fiscal Year (FY) 2005.

4.9.1.2. Regional Population

The area considered as Fort Riley's ROI, as defined by the U.S. Army's Economic Impact Forecasting System (EIFS), incorporates surrounding counties within an approximate 50-mile commute of the installation. Based upon this and other criteria, the ROI for Fort Riley consists of eight counties: Clay, Dickinson, Geary, Morris, Ottawa, Pottawatomie, Riley, and Wabaunsee. Geary and Riley Counties, within which Fort Riley is located, receives the majority of the direct and indirect social and economic impacts from Fort Riley. For example, in 2000, approximately one-third of the population of Geary and Riley counties consisted of Fort Riley active military personnel and family members, and civilians employed at Fort Riley.

Census records further suggest that the presence of Fort Riley contributes to local population maintenance and growth, and that the installation exerts a stabilizing influence on the population of the ROI. For example, U.S. Census Bureau *State & County QuickFacts* indicate that during the 100-year period from 1900 to 2000, five of the eight ROI counties have declined in population, and that one county steadily lost population through the 1970s before rebounding in the year 2000 to the level of 100 years earlier. Those trends are consistent with decades-long

population declines in many farm-dependent Midwestern counties. In contrast, the populations of Geary and Riley Counties have grown dramatically over the past 100 years (Geary County population has nearly tripled and Riley County population has more than quadrupled); that growth more than offsets population losses in nearby counties. Overall, the population of the eight-county Fort Riley ROI has grown by almost 35% over the past 100 years. The military mission at Fort Riley, combined with non-farm activities in Junction City and Manhattan, has provided a growing economic base for the ROI and its population over the last 100 years.

U.S. Census Bureau (2005) data show that four of the counties in the Fort Riley ROI experienced population decreases from 1990 to 2000: Geary County (-8.0%), Riley County (-6.0%), Clay County (-4.0%) and Morris County (-1.0%). The remaining four counties experienced an increase in population over that period, ranging from 2.0% (Dickinson County) to 12.0% (Pottawatomie County). The decrease in population in Geary and Riley counties can be attributed to military downsizing and realignments at Fort Riley. Operational levels at Fort Riley directly affect these two counties because they are the primary residency areas for the off-post military personnel and civilians employed at Fort Riley.

4.9.1.3. Elementary, Middle, and Secondary Schools

The total number of military and civilian personnel assigned to Fort Riley affects area schools. Children of military personnel that reside on-post attend schools in the Junction City Unified School District (USD) 475. The majority of Fort Riley military and civilian personnel that reside off-post live in or near Junction City and Manhattan, and their children attend school in Junction City USD 475 or Manhattan USD 383. According to the Fort Riley Economic Impact Summary (Plans, Analysis, and Integration Office, 2005), children of personnel assigned to Fort Riley comprise 64% of the student population of Junction City USD 475. Children of personnel assigned to Fort Riley comprise 18% of the student population of Manhattan USD 383.

The U.S. Department of Education provides federal impact aid to school districts that have federal lands in their jurisdiction. School districts receive federal impact aid for each student whose parents live or work on federal property. Estimated federal impact aid payments to Junction City USD 475 and Manhattan USD 383 reported in 2005 were $11,039,531 for USD 475 and $166,392 for USD 383 (Plans, Analysis, and Integration Office, 2005).

4.9.2. Economics

The capacity of a community to provide employment for its citizens is an indicator of that community's economic health. Table 4.5 summarizes the employment environment of the Fort Riley ROI. The largest work forces are found in Riley, Geary, Dickinson, and Pottawatomie Counties. Residents of those four counties comprise more than 80% of the Fort Riley ROI work force, and many of those workers find employment at the economic hub of the ROI: Fort Riley, Manhattan, and Junction City; communities that are the largest in the area and that constitute a nearly contiguous urban area of economic activity. The unemployment rate in the Fort Riley ROI was 5.3% in 2000, less than the national unemployment rate of 5.8% for that same year. According to the U.S. Census Bureau (2005), the median household income in 2000 for the Fort Riley ROI ranged from $31,917 in Geary County to $41,710 in Wabaunsee County. The statewide median household income was $40,624.

As described above and in Section 4.9.1.2, the economic impact of Fort Riley to the surrounding area is substantial. Fort Riley contributed $938,969,787 to the local economies in Fiscal Year 2005; i.e., October 1, 2004 through September 30, 2005 (Table 4.6).

Fort Riley operations generate substantial revenues to local economies through wage and salary payments to military and civilian employees, construction contractor payments, and operating costs such as rent and lease payments for various types of equipment, utilities, telephone, office supplies, and non-construction contracts. Purchases in the area by the approximately 10,000 military personnel assigned to Fort Riley and their 12,700 family members make a significant contribution to the retail and service segments of the regional economy.

Table 4.5 Fort Riley ROI Employment Summary (2000)

County	Work Force	Employed	Unemployed	Percent Unemployed
Clay	4,420	4,266	154	3.5
Dickinson	9,944	9,626	318	3.2
Geary	11,686	10,947	739	6.3
Morris	3,064	2,975	89	2.9
Ottawa	3,245	3,103	142	4.4
Pottawatomie	9,359	9,070	289	3.1
Riley	32,337	30,067	2,270	7.0
Wabaunsee	3,588	3,492	96	2.7
ROI	77,643	73,546	4,097	5.3

Source: *U. S. Census Bureau, 2005*

Table 4.6 Fort Riley Expenditures, Fiscal Year 2005

Activity	Amount ($)
Payroll[1]	709,744,022
Contracts, Supplies, and Services	77,856,139
Construction Projects	82,577,869
Other Miscellaneous Expenditures[2]	68,791,757
Total	**938,969,787**

[1]Pay for military personnel, civilian employees, and Army retirees.

[2]Funds for education, health care, and Combined Federal Campaign.

Source: Plans, Analysis, and Integration Office, *Economic Impact Summary FY 2005 Fort Riley, Kansas*

The positive contribution of Fort Riley can be expressed in another way – induced direct and indirect employment, or the number of jobs that are induced in the private sectors as a direct result of military troop levels and off-post expenditures. Despite the apparent day-to-day operation of Fort Riley as a self-sustaining installation, personnel and their dependents make considerable use of retail and service facilities, while the various groups and commands on-post annually contract or purchase millions of dollars in goods, services and equipment from area businesses. Those actions result in induced employment.

The concept of induced employment related to military installations was addressed in a number of studies and these studies have developed multipliers, which can be used to estimate the number of jobs that are created based upon an installation's military population and the number of civilians employed. The multipliers to be used to estimate the induced employment associated with the number of military personnel assigned to an installation range from 1.08 to 1.80. Put another way, this means that between 108 and 180 permanent jobs will be created in the private labor sector for each 100 military personnel assigned. The application of those multipliers reveals that between 10,800 and 18,000 jobs in the surrounding community have been created to support the approximately 10,000 military personnel assigned to Fort Riley.

The civilian employees at Fort Riley also have an impact on private employment in the surrounding communities. They spend a high proportion of their take-home pay, i.e. disposable personal income, in the local communities. Consequently, civilian workers at Fort Riley induce a proportionately higher number of jobs in the private sector than do the military personnel. It is estimated that the employment multiplier for civilian employees ranges between 2.5 and 3.0. This means that between 250 and 300 jobs are created for each 100 civilian employees at Fort Riley. On this basis, from 14,500 to 17,400 jobs are created because of the approximately 5,800 civilians employed on Fort Riley.

Based upon the analysis described above, the employment induced into the area around Fort Riley (from the multiplier effect of assigned military personnel and civilian employees) could range from as low as approximately 25,300 jobs to a high of around 35,400 jobs. The total civilian employment in the Fort Riley ROI totaled 77,643 in 2000. If the civilian employment on-post and the maximum induced employment off-post are combined, more than 50% of existing nonmilitary jobs in the Fort Riley ROI can be attributed to the presence of the installation.

4.9.3. Visual and Aesthetic Values

Natural resources enhance the aesthetic quality of Fort Riley. Located in the Flint Hills, Fort Riley contains rolling prairie hilltops with rugged riparian valleys; quality streams; and an abundance of fish and wildlife. The major stream corridors have retained much of their natural appearance and the bluffs and ridges of the Flint Hills provide panoramic views.

Aesthetically pleasing historic native limestone buildings arranged on the landscape with ample green space characterize the MPHD. Fort Riley's retention of the historical character of the MPHD provides an exceptional visual experience to residents, employees, and visitors.

The installation's layout reflects natural features, formal or informal designs, and distinctive styles and building materials. Features such as rivers, floodplains, hillsides impose natural constraints on the physical layout of Fort Riley. Cantonment (urban) areas, particularly those in the MPHD, appear interwoven among the natural features and interconnect with one another.

The use of cultivated plants in cantonment areas, combined with native plants in undeveloped areas, results in a pleasing variety of vegetative environments on post. Significant natural areas that remain relatively undisturbed include woodlands and native prairie tracts.

4.9.4. Recreational Activities

Common outdoor recreation activities at Fort Riley include organized sports (e.g., football, soccer, softball, golf), bird watching, hunting, hiking, fishing, mushroom hunting, walnut gathering, and mountain biking. The organized sports take place predominately in the Camp Whitside and Camp Forsyth areas, or on Custer Hill, in the southern portion of the installation. The other activities occur throughout the installation, except where prohibited (e.g., within the installation's permanent impact area).

Hunting and angling in particular account for many recreational outings taken by Soldiers, their families, and the public. During the 2004/2005 hunting season, 3,456 hunting trips were reported. The public, including many non -residents, accounted for 48% of the hunting trips. Creel censuses during past years indicate that approximately 35,000 fishing trips are taken on Fort Riley each year. The public takes approximately 30% of these.

4.10. Military Mission

An element of the affected environment is the installation mission. The Army separates garrison activities from military training and readiness activities at its installations in order to ensure the constancy of management and funding priorities for each entity. The Installation Management Command (IMCOM) directs garrison activities and U.S. Army Forces Command (FORSCOM) directs the training and readiness mission. Thus, the installation is composed of the Fort Riley garrison, and the 1st Infantry Division (ID) and its subordinate commands.

4.10.1. Fort Riley Garrison

4.10.1.1. Overview

Fort Riley is a permanent U.S. Army installation that exists in support of the 1st ID. Its basic function is to ensure that the 1st ID and other mission units have the training resources and facilities needed to meet their mission requirements. Wide ranges of activities occur on a regular basis at Fort Riley to conduct and support the 1st ID military mission. Many "ongoing activities" are essentially public works and commercial service functions required to allow people to live and work on the installation. Many of these activities are similar to those conducted in any non-military community of equal size, and include the following types:

- Administrative operations;
- Facilities repair, maintenance, construction, and alteration;
- Fuel and petroleum storage and dispensing;
- Grounds maintenance;
- Hospital, medical, and dental clinic operations;
- Installation and community support services;
- Natural and cultural resources management and environmental protection;
- Recreation;

- Road and right-of-way maintenance;
- Utility operations including infrastructure maintenance, repair, construction, and alteration;
- Warehousing and supply storage; and
- Vehicle and equipment maintenance or repair.

4.10.1.2. Garrison Objectives

The IMCOM has established a series of objectives for Fort Riley (U.S. IMA Strategic Plan, 2003). Those objectives most pertinent to this EA are well being, stewardship, and mission support. Wellness on Fort Riley consists of morale, welfare, and recreation. The aspect of well-being most relevant to the Proposed Action is that the garrison will "provide…safe environment in which to live, work, train and visit". One of the stewardship objectives is to meet all U.S. Army environmental goals. One of the critical mission support objectives of the Fort Riley garrison is to "actively participate in mission needs development". Others are to support the 1st ID in meeting contingency requirements, deployments, and participation in Army Transformation.

4.10.2. 1st Infantry Division

The mission of the 1st ID follows: On order, 1st ID deploys, conducts full spectrum operations as part of a Combined Joint Task Force or designated force headquarters, transitions to follow-on operations, and on order redeploys.

The three combat brigades: 1st Brigade, 1st ID; 3rd Brigade, 1st AD; and 4th Brigade, 1st ID; as well as a Combat Aviation Brigade (CAB); report to and receive guidance from the Commanding General (CG), 1st ID. They will, on order, deploy with or without equipment, build combat power, conduct military operations in support of the full range of worldwide contingency operations, and then redeploy. These organizations conduct the preponderance of their training at Fort Riley.

5.0 ENVIRONMENTAL CONSEQUENCES

During the planning and assessment phase of this project, Fort Riley developed two alternative courses of action to fully investigate potential environmental impacts of the Proposed Action:

- Implementation of the monofill project (preferred action), and
- No Action.

This section describes probable consequences (effects) of both alternatives on selected environmental resources and associated attributes. The resources and their attributes that are assessed are those directly linked to the relevant issues listed in Section 1.0, *Purpose and Need*.

Effects are changes from the current situation. The expected changes are described in quantitative and qualitative terms to aid in evaluating and contrasting the alternatives. The degree of change is described in terms of significance, duration and magnitude. The section includes discussion of:

- Direct effects and their significance.
- Indirect effects and their significance.
- Cumulative effects and their significance.
- Long and short-term effects.
- Unavoidable effects and any mitigation measures that would be implemented.
- Possible conflicts between the Proposed Action and the objectives of federal, regional, state, and local land use plans, policies and controls for Fort Riley.
- Any irreversible and irretrievable resource commitments.

The Environmental Consequences section is the scientific and analytical basis for comparison of the alternatives. The Army will use the information in this section to help determine which of the identified alternatives will be implemented.

Section 5.0 is organized by alternative, and the impact associated with each alternative. Resource impact assessment matrices have been included near the beginning of each subsection to summarize the impact of proposed actions and related alternatives. The reader should refer to the text narrative for information regarding the specific nature and extent of impact illustrated in these generalized summary matrices. The presence of impact, however, does not necessarily equate to significant impact. Impact can be minor and localized and not rise to the level of significance. Significance is determined based on magnitude and duration.

Each "Alternative" section is divided into subsections evaluating effects to natural resources related attributes (abiotic and biotic), cultural resources, the sociological environment, and the military mission.

5.1. Definition of Key terms

5.1.1. Direct versus Indirect Impact

The terms consequences, impact and effect are synonymous as used in this EA. Impact may be determined to be beneficial or adverse, and may apply to the full range of natural, aesthetic, historic, cultural, and economic resources of the installation and its environs. Where applicable, impact may be classified as direct or indirect. Definitions and examples of direct and indirect

impact as used in this document are as follows:

- **Direct Impact.** *A direct impact is caused by the proposed action, and occurs at the same time and place*. For example, loss of tree cover would be classified as a direct impact associated with construction of a new building on an existing woodland site.
- **Indirect Impact**. *An indirect impact is caused by the proposed action and is later in time or farther removed in distance, but still reasonably foreseeable.* Indirect impact may include induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, and other natural and social systems. Referring to the direct impact described above, the clearing of trees for new development may have an indirect impact on area streams by increasing the amount of soil erosion and sediment that reaches these streams during construction.

5.1.2. Short-term versus Long-term Impact

In addition to indicating whether impact is direct or indirect, the environmental consequence analysis also distinguishes between short-term and long-term impact. In this context, short-term and long-term do not refer to any rigid time period and are determined on a case-by case basis. In cases where both short-term and long-term impact is expected, the impact evaluation matrices generally illustrate the long-term consequences. Referring to the direct and indirect impact examples described above, the clearing of trees on a new construction site would be classified as a long-term impact, while erosion and siltation in nearby streams during the construction period would be classified as a short-term impact.

5.1.3. Significance

The term "significant", as defined in Paragraph 1508.27 of the regulations for implementing NEPA (CEQ 40 CFR 1500 et seq.), requires consideration of both the context and intensity of the impact evaluated. Significance can vary in relation to the context of the proposed action, and thus the significance of an action must be evaluated in several contexts and this varies with the setting of the proposed action. For example, context may include consideration of effects on a national, regional, and/or local basis depending upon the action proposed. Both short-term and long-term effects may be relevant.

In accordance with Paragraph 1508.27 of the regulations and the CEQ implementing guidance, impact also is evaluated in terms of its intensity or severity. Factors contributing to the evaluation of the intensity of an impact include, but are not limited to:

- The degree to which the action affects public health or safety.
- Unique characteristics of the geographic area where the action is proposed such as proximity to parklands, historic or cultural resources, wetlands, prime farmlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be controversial.
- The degree to which the effects of the action on the quality of the human environment are likely to be highly uncertain or involve unique or unknown risks.
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
- Whether the action is related to other actions with individually insignificant but

cumulatively significant impact. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
- The degree to which the action may adversely affect an endangered or threatened species, or its habitat, that was determined to be critical under the Endangered Species Act of 1973.
- Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

An Environmental Impact Statement (EIS) would be required if it is determined, as part of this EA, that the alternative chosen for implementation would create significant impact. The EIS would investigate impact in more detail as well as identify mitigation strategies designed to minimize impact.

5.2. Effects of Alternative 1 – the Proposed Action

Fort Riley anticipates short-term or long-term, or both, beneficial impacts to the environment for solid waste management, air quality, the military mission, and the sociological environment from the Proposed Action (Table 5.1). Effects of the Proposed Action, primarily from anticipated construction activity, would adversely affect a number of local environmental elements, but those effects would remain below threshold levels considered significant. The installation anticipates minor adverse impacts to air quality (short-term only), soils, and flora and fauna.

The Fort Riley initiative to construct and use the proposed monofill would ensure the ability of the installation to continue the production of potable water for its soldiers and citizen, which would ultimately support the installation's mission to provide for operational readiness. The Proposed Action does not compromise the commitment of Fort Riley to maintain, protect, and improve human health and welfare; and to protect and enhance biological communities, particularly sensitive, rare, threatened and endangered species. Therefore, this is the preferred alternative. Discussion of specific resource areas and environmental consequences expected from the Proposed Action follows.

Construction and use of the proposed monofill would benefit military training and readiness by ensuring the ability of Fort Riley to produce a safe and ready supply of potable water for its soldiers and citizens.

5.2.1. Fort Riley Environment for Solid Waste Management

Fort Riley anticipates minor, direct and indirect, short- and long-term beneficial impacts to the environment for solid waste management due to the implementation of the Proposed Action. The proposed monofill would allow the installation to continue to dispose of its DWTP lime sludge in a safe and economical manner.

Fort Riley's initial investment of funds for monofill construction would generate annual cost savings over the life of the project, because of the proposed monofill's proximity to the existing drying beds at the DWTP. Unlike the current lime sludge monofill cell at the CDL that is located approximately five miles northeast of the DWTP drying beds, the new monofill would lie about one-fifth of a mile away. Thus, labor and equipment costs to haul lime sludge from the

DWTP drying beds to the monofill would decrease substantially. Truck operators would no longer travel on busy Fort Riley thoroughfares to dispose of lime sludge at the remote CDL, and thus, the installation would realize a reduced potential for a roadside spill of the material.

The installation anticipates no effect to its management and recycling of the remainder of its solid waste, the management of the installation's single active landfill (the CDL), and the installation's activities to monitor and manage closed on-post landfills.

Table 5.1 Anticipated Effects of the Lime Sludge Monofill

	Direct Effects	Indirect Effects	Short-Term Effects	Long-Term Effects
Environment for Solid Waste Management	+	+	+	+
Lime Sludge Regulation and Safety	0	0	0	0
Land Use	0	0	0	0
Air Quality	-	+	-	+
Soils	-	-	-	-
Water	0	0	0	0
Flora and Fauna				
Flora	-	0	-	-
Fauna	-	0	-	-
Cultural Resources	0	0	0	0
Sociological Environment	+	+	+	+
Military Mission				
1st Infantry Division	+	+	+	+
Fort Riley Garrison	+	+	+	+
Impact expected: (+) positive (-) negative (0) none				

5.2.2. Lime Sludge Regulation and Safety

Fort Riley anticipates no impact to the environment for lime sludge regulation and safety due to the implementation of the Proposed Action.

Through the KDHE permitting process for the proposed monofill, a professional engineer (PE) would certify the facility's design. That design, coupled with the construction footprint's soils (not limited for landfill use as discussed in Sections 4.5 and 5.2.5), would prevent the runoff or leaching of lime sludge from the monofill. Additionally, the primary substances found in the sludge from the lime-softening process (calcium carbonate and magnesium hydroxide), and un-reacted lime (hydrated lime or quicklime), are not hazardous chemicals (U.S. Department of Health and Human Services, 1997; J.J. Keller & Associates, 2003). A brief description of each substance, along with a discussion of its hazard potential, follows:

Calcium carbonate is a stable, odorless, non-flammable solid. It is not regulated as a hazardous substance or material under CERCLA or RCRA. A primary health and safety concern is the avoidance of the inhalation of calcium carbonate dust. The dust is a skin and eye irritant also. Calcium carbonate has many industrial applications (e.g., filler material, agricultural liming,

neutralization, desulphurization, and supplementation to domestic animal feed).

Magnesium hydroxide is a stable, odorless, non-flammable solid. As with calcium carbonate, safety concerns for magnesium hydroxide include the avoidance of dust inhalation, skin contact, and eye contact to prevent irritation. Magnesium hydroxide is not regulated under CERCLA or RCRA. A common application for magnesium hydroxide is known as "milk of magnesia": a mildly alkaline suspension of magnesium hydroxide that may be used as a laxative, taken to relieve indigestion and heartburn, or used as an antacid.

Quicklime or hydrated lime would comprise any un-reacted lime in sludge placed in the proposed monofill. Hydrated lime and quicklime are odorless, non-flammable solids that are not regulated as hazardous substances under CERCLA or RCRA. Safety concerns for these substances include the avoidance of dust inhalation, skin contact, and eye contact to prevent irritation.

Contaminants in lime sludge include metals in trace amounts. The absorption of high concentrations of metals can be toxic to organisms, including humans. Pathways to humans can include the entry of metals into the soil or groundwater, with subsequent exposure through eating, drinking, breathing, or touching. While the KDHE does not require Fort Riley to test its lime sludge for contaminants, metals in the installation's lime sludge are not known to have reached actionable levels for the State of Kansas based on testing of raw water coming into the DWTP. A Florida study, which sampled sludge from 20 facilities employing lime-softening, analyzed the metals content of each facility's lime sludge (Florida Department of Environmental Protection, 2006). Those results were averaged to produce a general characterization of the metals content of lime-softening sludge. Average levels of aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, sodium, selenium, silver, and zinc were all below actionable levels (known as cleanup target levels in the State of Florida). In some cases, average levels were below detection limits. Fort Riley, given the groundwater source of its raw water and its lime-softening method of treatment, would expect trace amounts of metals in its DWTP lime sludge, but would not expect metals concentrations to exceed actionable levels. Furthermore, the monofill's design, location, and soils would inhibit the movement of metals through the soil and into the groundwater.

Suspended solids and organics (carbon compounds) also constitute contaminants in lime sludge, but the proposed monofill would prevent those materials from entering the environment.

5.2.3. Land Use

Fort Riley anticipates no adverse impact to land use due to the implementation of the Proposed Action. The proposed monofill would convert approximately 12 acres of training land to industrial use, but without a discernible impact to training. The project site is located adjacent to the DWTP and the Camp Forsyth cantonment area, separated from large maneuver areas by other cantonment areas, roads, and stream channels. Thus, the site is not fundamental to military training. At the end of the facility's estimated 12.9-year lifespan, the installation would maintain the capped monofill as open space, or reuse it in a manner compatible with closed monofill management and the conditions of the KDHE monofill permit. The Proposed Action is consistent with Fort Riley's land use plans.

5.2.4. Air Quality

Fort Riley anticipates minor, indirect long-term beneficial impact to air quality, because the Proposed Action would enable the installation to condense substantially its recurrent, emission-

producing trucking operations to haul lime sludge from drying beds to the monofill.

Minor, direct short-term adverse impacts to air quality would result from the proposed construction of the monofill. Construction activities such as earth moving with heavy equipment, driving on unpaved surfaces, and other construction activities would introduce particulate matter (dust) into the atmosphere. Construction activities also create temporary sources of exhaust emissions from construction vehicles and equipment. Both the dust emissions and exhaust emissions associated with construction would be temporary and originate primarily in the project area.

Minor, indirect short-term adverse impacts to air quality would occur if dust or vehicle emissions generated by construction activities travels off site. Similar minor, short-term indirect impacts would result from the open burning of construction debris, if the technique is used. Efforts would be made to minimize the likelihood that fugitive emissions would leave the construction area and potentially affect citizens on private lands. For example, personnel could implement dust suppression techniques at construction sites. Personnel could mitigate impacts from open burning by not burning extremely harmful materials, timing the burns to coincide with appropriate weather conditions, and so forth.

Personnel would employ the following air quality related Best Management Practices (BMPs) during construction:

- The release of fugitive emissions would be minimized. For example, during dry weather conducive to high dust emissions, suppression measures could be applied to the construction site. Fugitive emissions control would conform to applicable regulations.
- Open burning, if used, would be conducted in accordance with applicable regulations. Open burning is defined as "the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney." Prior to any open burning, consultation with the DPW Environmental Division Air Program Manager, USEPA Region 7 Air Program, and/or the KDHE Bureau of Air and Radiation would take place. Techniques to minimize the impacts of open burning to air quality (e.g., avoiding scheduling the burning on windy days, not burning certain hazardous materials) would be employed.

5.2.5. Soils

Minor, direct long-term adverse impacts to soils at the construction site would occur because the project would require grubbing, grading, and earthmoving to construct the proposed monofill. Several factors would mitigate construction impacts. As part of the site selection process, Fort Riley chose the site because it has already been mined of topsoil. The site's proximity to an existing road would reduce the soil disturbing activities that construction personnel would undertake to link the monofill to an improved road and the DWTP drying beds. Soil excavated on-site to create the monofill cell would be used to construct the perimeter berms, and thus, would minimize the need to "borrow" additional soil elsewhere. However, if needed, the installation would likely mine soil from established borrow sites on Fort Riley.

Short-term soil erosion would occur at the construction site. The installation would use the following BMPs to reduce the potential for soil erosion at and near the project site:

- Provisions would be taken during the construction to help preclude the introduction of pollutants into groundwater systems. These standard well-head protection measures used

during construction, when coupled with design features intended to manage the flow of surface water, should prevent impacts to domestic drinking water sources.

- Vegetation and structural erosion control practices would be employed and maintained according to standards and specifications of the State of Kansas, and/or the USEPA document entitled *Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices* (1992). The more stringent of the standards would be employed. All areas disturbed by construction activities would be seeded or have sod placed over them, and fertilized unless the area is to be paved or built upon.
- Soil disturbance has a high potential to result in increased soil erosion and sediment loading in storm water runoff. Mulching, silt fences, sediment traps, straw berms, temporary cover crops, or other erosion control measures would be used to reduce soil erosion at construction sites. Where applicable, NRCS Critical Areas standards for erosion control, State of Kansas requirements for storm water discharge permits for construction sites, as well as other BMPs, would be used to reduce erosion and protect the water quality of receiving streams. These BMPs provide for the reestablishment of both temporary and permanent vegetative cover (through planting, seeding, or sodding with appropriate vegetation), and would be included in the project.
- Landscaping of the construction site would include the removal and stockpiling of top soil prior to construction, spreading top soil after construction, replanting of areas with appropriate vegetation, and mulching all seeded areas at construction sites.
- Surface water control features, including the construction of drainage swales, or temporary and permanent surface water retention and control ponds, would be developed as required by the stormwater control plan. Surface water retention and control ponds would provide sediment control and reduce the potential for sediment transport from the construction site to surface water resources. All erosion and sediment control measures would be in place prior to, or as the first step in the construction project.
- Clearing and grubbing would be sequenced with construction to minimize the exposure time of cleared surfaces. These activities would not be conducted during periods of excessively wet weather. Performing potentially erosive construction activities during dry periods and utilization of proper construction techniques would minimize possible impacts to water quality.
- Construction activities would also be staged to allow for the stabilization of disturbed soils.
- Erosion and sediment control measures would be maintained during construction efforts, and afterwards until vegetation has established in a manner to ensure compliance with Clean Water regulations. Fort Riley would implement erosion control measures in accordance with normal construction practices required by the U.S. Army Corps of Engineers (USACE) for all construction project elements (including those accomplished by civilian contractors and government personnel). However, as general provisions of construction contracts do not normally state specific methods that must be used to control soil erosion, performance requirements would be implemented. Costs associated with erosion control plans are included in the funded construction program.

Although BMPs are not 100 percent effective in preventing sediment runoff, the installation

would attempt to ensure that construction personnel remain in compliance with established permit and BMP requirements.

Geary silt loam comprises almost the entire project site. The NRCS rates Geary silt loam as "not limited" for landfill use, which means that the soil has features that are very favorable for monofill construction. Fort Riley personnel would expect good performance and low maintenance from Geary silt loam used to construct the monofill.

5.2.6. Water Resources

Fort Riley anticipates no adverse impact to surface water due to the implementation of the Proposed Action. Construction activities that include grubbing, grading, or earthmoving would remove surface vegetation in the project area, and would increase the potential for sediment loading in surface runoff. However, vegetation surrounding the construction site would filter any eroded soil from that surface runoff prior to its deposition in the nearest stream channels, which are ephemeral. Any construction activities affecting streams would be subject to CWA Section 401 and 404 permits, and stormwater provisions and effluent standards under Parts 9, 122, 123, and 124.

The project will disturb more than one acre based on its dimensions and scope of work. Thus, the project will require a stormwater construction permit obtained from the KDHE. Such permits are to be obtained from the KDHE 60 days prior to beginning a project. Application for the permit requires preparation of a Stormwater Pollution Prevention Plan (SWP3). The general requirements specified for a complete SWP3 include:

- Preparation by a licensed or certified professional,
- Selection, installation, utilization, operation, and maintenance of BMPs in accordance with the concepts and methods described in USEPA document number EPA 833-R-92-001, entitled *Stormwater Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices*, published in October, 1992,
- Installation of temporary and permanent, structural and non-structural BMPs, sedimentation basins, permanent stormwater management,
- Use of additional BMPs as necessary to prevent contamination of stormwater runoff,
- Inspection of site BMPs within 24 hours of the end of a 0.5-inch or greater precipitation event and corrective action as needed within 7 calendar days of that inspection, and
- Avoidance or minimization of impacts to barriers that reduce soil erosion, including vegetation or other natural barriers.

Compliance with the conditions of the construction stormwater permit, including those for the use of BMPs, is mandatory. An operator not fulfilling his or her obligations, as agreed upon by signing the Notice of Intent (NOI) in the application for the construction stormwater permit, is considered in violation of the CWA, which is grounds for injunctive relief, substantial monetary penalties, incarceration, changes to or termination of the permit, or denial of permit renewal. Additional information on related BMPs is located in the subsection 5.2.5.

5.2.7. Flora and Fauna

This section describes anticipated effects to native flora and fauna, including T&E and rare species.

5.2.7.1. Floral Communities

Minor, direct short- and long-term adverse impacts to floral communities would occur because of the proposed monofill's construction. The facility would replace the majority of the grasslands on the 12-acre project area. Fort Riley anticipates only a negligible adverse impact to the overall grassland ecosystem, because a substantial portion of the project area consists of a former soil borrow site with poor-quality prairie. The remainder of the project area's prairie, although of higher quality, amounts to a small proportion of the overall construction footprint. Following the construction phase, Fort Riley anticipates no impact to the baseline condition for floral communities from the operation of the proposed monofill.

5.2.7.2. Faunal Communities

Fort Riley anticipates minor, direct short- and long-term adverse impact to wildlife species because of construction of the proposed monofill. Construction of the facility would replace the grassland habitat of the project area, most of which is of poor quality. The loss of the project area's grassland habitat, although of low quality, would displace wildlife utilizing that area. Species that are not highly mobile could be injured or killed during site-disturbing activities to construct the monofill. Fort Riley anticipates no effect to T&E species or habitats.

5.2.8. Cultural Resources

Fort Riley anticipates no direct or indirect adverse impacts to cultural resources because of the Proposed Action.

In 1903, W.J. Griffin excavated a burial mound on land within the proposed monofill's footprint. A subsequent archeological survey conducted in 1977 by Patricia O'Brien on the same site confirmed the presence of an earthen Native American burial mound. However, a 2005 survey conducted by the Public Service Archeology Program of the University of Illinois did not identify a burial mound on the site, likely because the installation mined topsoil from the area to construct the nearby DWTP in 1992 or 1993. A recent walkover of the proposed project area and the review of aerial photos confirm that the soil mining occurred. No readily observable indications of the burial mound remain on the site.

Based on the findings of the 2005 archeological survey, and results of the recent walkover and aerial photo review, the archeology staff at Fort Riley holds the opinion that the soil mining activities of the early 1990s destroyed the historic context of the mound. The installation may, as deemed necessary by the installation archeologist, conduct another archeological survey on the proposed monofill site to validate the finding that the burial mound no longer exists there. Prior to the beginning of proposed monofill construction activities, Fort Riley would complete a formal consultation with the SHPO and the Kaw and Pawnee Nations of Oklahoma, and obtain concurrences with Fort Riley's finding of no impact to historic properties from the SHPO and the Kaw and Pawnee Nations of Oklahoma.

Fort Riley complies with the NHPA of 1966, as amended, and the ARPA of 1979 to ensure that historic and prehistoric sites are treated appropriately when Army actions have the potential to affect those sites. Cultural resources management staff at the installation operate under guidance provided by the Fort Riley 2001 ICRMP (U.S. Army, Fort Riley DES, 2001c) and work to ensure the preservation of significant historic sites and structures.

BMPs implemented as part of the Proposed Action, designed to either reduce or eliminate impacts to potential cultural resources include the following:

- Compliance with Sections 106 and 110 of the NHPA prior to facilities construction would ensure avoidance of impacts to sites that could potentially exist within project areas. Protection of resources also would adhere to Appendix D, Standard Operating Procedures (SOPs) #1, #8, #9 of the ICRMP and AR 200-4.
- If an unexpected archaeological discovery occurs during construction activities, the Emergency Discovery of Archaeological Properties [Appendix D, SOP 10] as defined in the Fort Riley ICRMP would be followed. If archaeological properties were discovered, excavation and disturbance of the site would cease. The Cultural Resources Management Administrator (CRMA) or staff archaeologist would be notified immediately. The CRMA or staff archaeologist would evaluate the significance of the finding and issue new guidance through the Environmental Division, DPW.
- If, because of construction, an important archaeological site, Traditional Cultural Property (TCP), or above ground property is damaged, the incident would be reported and a reasonable effort would be made to identify the responsible parties and to repair/replace the damaged resources in an effort to mitigate the loss pursuant to CRM PA SOP #7.
- Should Native American human remains, of which the Kaw or Pawnee Nations of Oklahoma may have custody, be inadvertently discovered and unintentionally excavated, procedures as outlined in the Comprehensive Agreements between Fort Riley and the Kaw and Pawnee Nations of Oklahoma would be followed (Appendix F.1 of the ICRMP).
- If there is an inadvertent discovery of human remains determined to be Native American, of which the Kaw or Pawnee Nations of Oklahoma do not have custody, then procedures as outlined in the NAGPRA SOP #1 would be implemented (25 U.S.C. 3002, Sec. 3(d); 43 CFR 10.4; AR 200-4§2-4).
- If an intentional archaeological excavation of Native American human remains, associated funerary objects, sacred objects, and/or objects of cultural patrimony would occur, procedures as dictated by NAGPRA, Appendix F.2, NAGPRA SOPs #2 and #3 of the ICRMP would be followed (25 U.S.C. 3002, SEC. 3(c); 43 CFR 10.3; AR 200-4§2-4).

5.2.9. Sociological Environment

Fort Riley anticipates minor, direct and indirect, short- and long-term beneficial impacts to the economies of the region because of the Proposed Action. Direct payments to monofill construction personnel would contribute to local employment, income, and sales volume in the short-term. Secondary sales, employment, and income that could flow from primary sources to communities during monofill construction would produce indirect short-term benefits to local economies. Over the long-term, payments to personnel to maintain and operate the proposed monofill, and payments to procure materials and supplies for its maintenance and operation, would benefit the economies of the region. As described under Section 5.2.1, construction of the monofill on the proposed site adjacent the DWTP would reduce Fort Riley's costs to haul and dispose lime sludge. Funds resulting from cost savings could be redirected to other installation projects or activities. Fort Riley anticipates no significant impacts to demographics, visual and aesthetic values, or recreation because of the Proposed Action to construct and operate the monofill.

5.2.10. Military Mission

Fort Riley anticipates minor, direct and indirect, short-term and long-term beneficial impacts to the installation's mission from implementation of the proposed monofill initiative. Under the Proposed Action, Fort Riley could continue to produce potable water for the support of its soldiers and citizens.

Fort Riley anticipates minor, direct and indirect, short-term and long-term beneficial impact to the garrison from the proposed monofill initiative. The Proposed Action would ensure the continued supply of potable water to garrison personnel for use during activities in support of Fort Riley's mission. Overall, the Proposed Action would enhance operational readiness, and would contribute to the viability of Fort Riley as a training center over the long-term.

5.3. Effects of Alternative 2 – No Action

Under the No Action alternative, construction and use of the proposed monofill would not occur. Fort Riley anticipates that the No Action alternative would yield minor adverse effects to the environment for solid waste management, air quality, and the military mission (Table 5.2). The No Action alternative would not facilitate the installation's safe, efficient, and cost-effective disposal of its lime sludge, and thus, would not enhance the capability of Fort Riley to accomplish its mission. Therefore, implementation of the No Action alternative is not favored.

Table 5.2 Anticipated Effects of the No Action Alternative

	Direct Effects	Indirect Effects	Short-Term Effects	Long-Term Effects
Environment for Solid Waste Management	-	-	-	-
Lime Sludge Regulation and Safety	0	0	0	0
Land Use	0	0	0	0
Air Quality	0	-	-	-
Soils	0	0	0	0
Water	0	0	0	0
Flora and Fauna				
Flora	0	0	0	0
Fauna	0	0	0	0
Cultural Resources	0	0	0	0
Sociological Environment	0	0	0	0
Military Mission				
1st Infantry Division	-	-	-	-
Fort Riley Garrison	-	-	-	-
Impact expected: (+) positive (-) negative (0) none				

5.3.1. Fort Riley Environment for Solid Waste Management

Fort Riley anticipates minor, direct and indirect, short-term and long-term adverse impacts to the environment for solid waste management under the No Action alternative. A decision of No Action would not construct the monofill, and thus, would not facilitate the installation's safe and

cost-effective, on-post disposal of its lime sludge. Fort Riley would incur recurrent, higher costs (e.g., labor, equipment, and fuel costs; disposal fees) to haul and dispose of lime sludge at a KDHE permitted site off-post.

5.3.2. Lime Sludge Regulation and Safety

Fort Riley anticipates no impact to the environment for lime sludge regulation and safety under the No Action alternative, because the installation would continue to comply with regulatory requirements for lime sludge disposal, likely by disposing of lime sludge off-post.

5.3.3. Land Use

Fort Riley anticipates no impacts to land use under the No Action alternative, because installation activities with the potential to affect land use would remain at the baseline level.

5.3.4. Air Quality

Fort Riley anticipates indirect, short-term and long-term, adverse impacts to air quality under the No Action alternative. Construction activity and military training would remain at the baseline condition, but trucking the DWTP lime sludge longer distances to off-post disposal sites would produce exhaust emissions above the baseline level for Fort Riley's solid waste management.

5.3.5. Soils

Fort Riley anticipates no impacts to soil resources under the No Action alternative, because construction activities with the potential to disturb soils would remain at the baseline level.

5.3.6. Water Resources

Fort Riley anticipates no impacts to water resources under the No Action alternative, because construction activities that could cause erosion and sedimentation would not take place.

5.3.7. Flora and Fauna

Fort Riley anticipates no impacts to floral communities under the No Action alternative, because construction activity that could affect the environment for plants would not take place. The installation anticipates no impacts to faunal communities under the No Action alternative. Without the Proposed Action to construct and subsequently use the monofill, activities with the potential to startle, injure, or kill wildlife would remain at baseline levels, and activities that could affect habitat would remain at baseline levels. No direct or indirect adverse impacts to federal T&E species are anticipated under the No Action alternative.

5.3.8. Cultural Resources

Fort Riley anticipates no impacts to cultural resources under the No Action alternative. Without the Proposed Action to construct the monofill, activities with the potential to affect cultural resources would remain at baseline levels.

5.3.9. Sociological Environment

Fort Riley anticipates no impact to local or regional demographics or economics under the No Action alternative. The baseline condition for those aspects is anticipated to remain at current levels.

5.3.10. Military Mission

Fort Riley anticipates minor, direct and indirect, short-term and long-term adverse impacts to the 1st ID from the No Action alternative. A decision of No Action would not construct the

monofill. Thus, in two or three years when ongoing DWTP lime sludge deposals fill to capacity the existing CDL monofill, Fort Riley would have no safe and cost-effective on-post facility for the disposal of its slime sludge. The installation would likely resort to hauling the material off-post for disposal, which would be more expensive, or more labor intensive, or both. That more expensive off-post disposal would reduce the funding available for use elsewhere on Fort Riley to support the military mission and the garrison. The No Action alternative would not enhance Fort Riley's viability as a training center over the long-term.

5.4. Cumulative Effects

A cumulative effect is defined as an effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place locally or regionally through time.

5.4.1. Alternative 1 – Construction and Use of the Monofill

The Proposed Action is consistent with Fort Riley's mission to provide Training and Operational Readiness in defense of the Nation. Construction and use of the proposed monofill would allow Fort Riley to continue its operations to produce safe drinking water for its soldiers and citizens, which would enhance the installation's capability to support its military training mission. Those outcomes would contribute to the viability of Fort Riley as a training center over the long-term.

The initiative to construct and operate the proposed monofill, in combination with other Army actions to train, support, and deploy effective fighting forces, is expected to result in a cumulative, long-term beneficial effect to the military mission and the sociological environment.

As part of the Army's ongoing implementation of the AMF, BRAC, and IGPBS initiatives, Fort Riley expects to grow to an end-state of approximately 18,000 Soldiers in the next few years. Fort Riley anticipates no significant impacts to the environment from the synchronized implementation of AMF, BRAC, and IGPBS activities at the installation, as documented in the 2004 *Environmental Assessment, Modular Reorganization of Forces for Fort Riley Army Installation, Kansas* (U.S. Army, Fort Riley DES, 2004); and in the 2006 supplement to that EA entitled, *Supplemental Environmental Assessment of the Modular Reorganization of Forces at Fort Riley Army Installation, Kansas* (U.S. Army, Fort Riley DPW Environmental Division, 2006).

Fort Riley anticipates the construction of several range projects in the next six or seven years. The installation is currently constructing a new Automated Multi-Purpose Training Range (AMPTR), and will complete a digital upgrade of the existing MPRC in the next two to three years. More information on those Fort Riley range initiatives may be found in the following document: the 2004 *Environmental Assessment, Construction and Operation of a New Automated Multi-Purpose Training Range and Upgrade of an Existing Multi-Purpose Range Complex, Fort Riley, Kansas* (U.S. Army COE, 2004).

Army planners have tentatively scheduled other Fort Riley range construction or improvement initiatives for the years ahead: an Infantry Squad Battle Course, Infantry Platoon Battle Course, Modified Record Fire, Known Distance Range, and Qualifications Training Range. Another focus of Army trainers is the establishment of mock urban villages in the training areas to simulate the modern challenges of urban warfare.

The construction and use of the proposed monofill, in combination with other initiatives to

support soldiers and citizens, and the mission-related initiatives described above, would ensure that Soldiers experience optimal training at the installation. That outcome would enhance their readiness for future challenges on the battlefield. These actions would contribute to Fort Riley's viability as a military training center, and help ensure that the installation remains an integral part of local communities in the future.

Fort Riley anticipates no significant cumulative adverse impacts from implementation of the Proposed Action and the planned initiatives described in this section of the EA. The installation would mitigate the combined effects of future construction projects, to the fullest extent feasible, by siting those projects away from environmentally sensitive areas, and reusing former facilities sites or other previously disturbed areas. The Proposed Action would not affect the frequency or intensity of noise events from large caliber weapons firing.

No other actions that would individually generate minor or moderate impacts, that could combine to generate significant impacts, are foreseeable.

5.4.2. Alternative 2 - No Action

The No Action alternative is inconsistent with Fort Riley's mission to provide Training and Operational Readiness in defense of the Nation. Implementation of No Action would not advance the Army’s effort to support soldiers and citizens while providing military training. A decision of No Action would not provide Fort Riley with cost-efficient and environmentally sound facilities for lime sludge disposal in support of the installation and its training mission. Thus, it would not contribute to the long-term viability of Fort Riley as a training center.

Fort Riley anticipates no beneficial cumulative effects because of the implementation of the No Action alternative. Anticipated cumulative benefits from the Proposed Action to the sociological environment and the military mission would not occur under the No Action alternative.

Cumulative adverse impacts to the sociological environment and the military mission could occur under the No Action alternative because impacts from a decision of No Action could combine with other Army future actions (or no actions) to reduce the long-term viability of Fort Riley. No other cumulative adverse impacts are anticipated under the No Action alternative.

6.0 CONCLUSION

This EA was conducted in compliance with the NEPA CEQ Regulations, 40 CFR 1500 et seq., and AR 200-2 (*Environmental Analysis of Army Actions*). The results of this EA indicate the following conclusions:

The initiative to construct and use the proposed monofill is consistent with Fort Riley's mission to provide Training and Operational Readiness, while managing the environment for sustainability. The Proposed Action does not compromise the commitment of Fort Riley to maintain, protect, and improve human health and welfare; and to protect and enhance biological communities, particularly sensitive, rare, threatened and endangered species. The anticipated absorption of minor adverse impacts to soils, air quality (over the short-term), and flora and fauna would enable the installation to realize the anticipated beneficial impacts to the environment for solid waste management, air quality (over the long-term), the sociological environment, and the military mission. Therefore, this is the preferred alternative.

Under the No Action alternative, the proposed construction of the monofill would not occur, which would create a future shortfall of facilities or means for the cost-efficient disposal of Fort Riley's lime sludge. The implementation of the No Action alternative would not support the efforts of the installation to provide its soldiers and citizens with safe potable water while minimizing costs, would not support Training and Operational Readiness in defense of the Nation, and would not enhance the viability of Fort Riley as a long-term military training center. The installation anticipates that the No Action alternative would result in adverse effects to the environment for solid waste management, air quality, and the military mission. Thus, a decision of No Action is not favored.

Fort Riley anticipates that no significant environmental effects would result from the proposed construction and use of the monofill, and thus, preparation of an Environmental Impact Statement is not required. Therefore, a Finding of No Significant Impact (FNSI) and a Notice of Availability (NOA) have been prepared for this action.

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Appendix A: Acronyms Defined

ACHP	Advisory Council on Historic Preservation
AMF	Army Modular Force
AMPTR	Automated Multi-Purpose Training Range
AQCR	Air Quality Control Regions
AR	Army Regulation
ARPA	Archaeological Resources Protection Act
BMP	Best Management Practice
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAAA	Clean Air Act Amendment
CAB	Combat Aviation Brigade
CDL	Construction/Demolition Landfill
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CG	Commanding General
CRMA	Cultural Resources Management Administrator
CWA	Clean Water Act
DA	Department of the Army
DBH	Diameter at Breast Height
DoD	Department of Defense
DPW	Directorate of Public Works
DWTP	Drinking Water Treatment Plant
EA	Environmental Assessment
EIFS	Economic Impact Forecasting System
EIS	Environmental Impact Statement
ESMP	Endangered Species Management Plan
FNSI	Finding of No Significant Impact
FORSCOM	U.S. Army Forces Command
FY	Fiscal Year
HAP	Hazardous Air Pollutant
ICRMP	Integrated Cultural Resources Management Plan

ID	Infantry Division
IGPBS	Integrated Global Presence and Basing Strategy
IMCOM	Installation Management Command
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ISWMP	Integrated Solid Waste Management Plan
KBS	Kansas Biological Survey
KDHE	Kansas Department of Health and Environment
KDWP	Kansas Department of Wildlife and Parks
MPHD	Main Post Historic District
MPRC	Multi-Purpose Range Complex
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTMB	Neotropical Migrant Bird
OP	Operating Plan
P2	Pollution Prevention Branch
PA	Programmatic Agreement
PE	Professional Engineer
RCI	Residential Communities Initiative
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Officer
SINC	Species in Need of Conservation
SOC	Species of Concern
SOP	Standard Operating Procedure
SWP3	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Property
T&E	Threatened and Endangered Species
USACE	U.S. Army Corps of Engineers

USD	Unified School District
USDA	U.S. Department of Agriculture
USDA-WS	U.S. Department of Agriculture-Wildlife Services
USEPA	U. S. Environmental Protection Agency
USFWS	U. S. Fish and Wildlife Service
VOC	Volatile Organic Compound